ELECTRICAL TIMES

THURSDAY
14 DEC.
1950
SIXPENCE

B.I. Callender's

PRESSED COPPER SERVICE BOXES

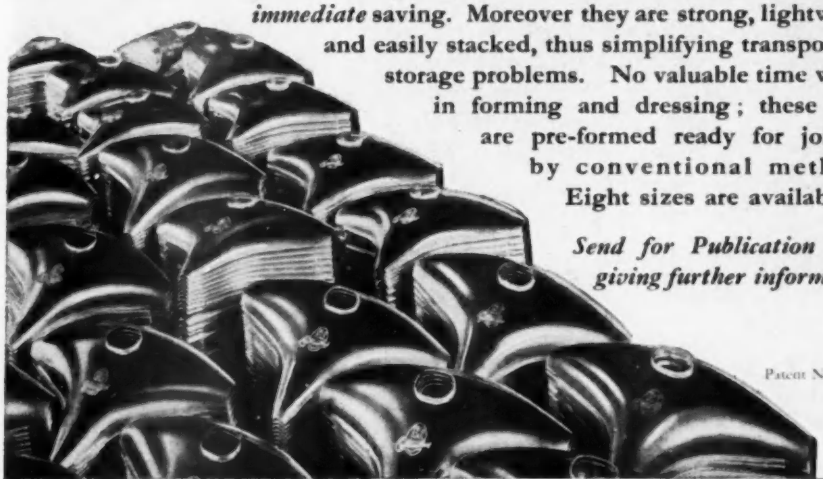
LIGHTWEIGHT

ECONOMICAL

READY FOR USE

Consider the benefits obtained by using BICC Pressed Copper Service Boxes. With lead at its present high price, the purchase of COPPER boxes shows an *immediate* saving. Moreover they are strong, lightweight and easily stacked, thus simplifying transport and storage problems. No valuable time wasted in forming and dressing; these boxes are pre-formed ready for jointing by conventional methods. Eight sizes are available.

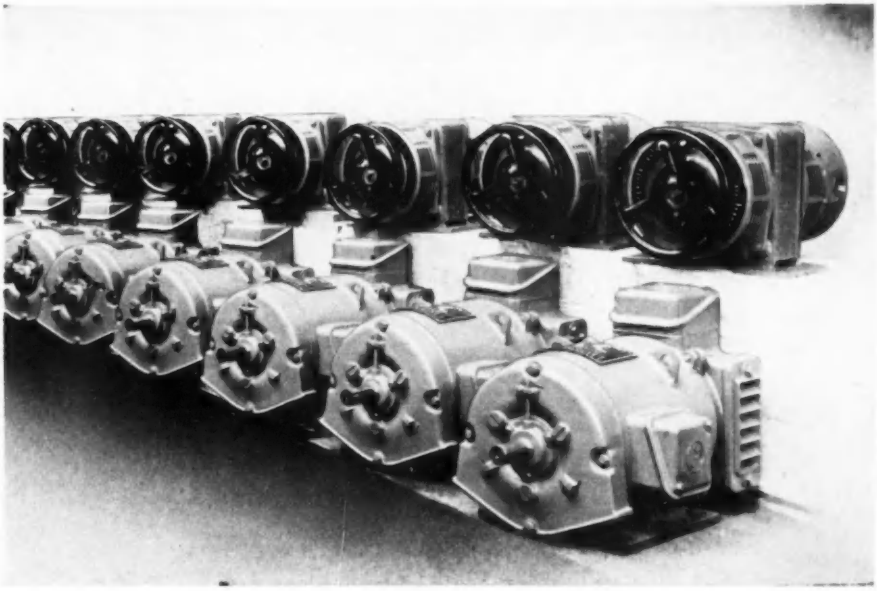
Send for Publication 211W. giving further information.



Patent No. 614477

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

it sells itself...
It sells on appearance . . . it sells on cooking space . . . it sells on performance . . . and it is supported by selling advertising and selling literature. That is why the B.N.E. C.49 is in and out of the showroom so quickly.
Attractive selling aids available on request.
B.N.E. Model C49
BRITISH NATIONAL ELECTRICS LTD.
The Domestic Appliances Section of JOHNSON & PHILLIPS LTD.
NEWARTHILL · MOTHERWELL · SCOTLAND



STEPLESS SPEED VARIATION IN THE 1 - 10 H.P. RANGE — *efficient, simple, from stock*

It isn't only on the bigger jobs that the "N-S" variable speed a.c. motor proves its worth. In many instances, stepless speed control is just as important for machines needing under ten horsepower.

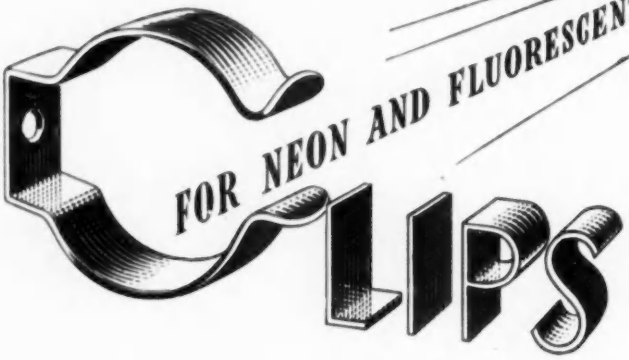
That is why we have produced a standard line of small-power "N-S" motors, covering a useful choice of speed ranges, which are available for prompt delivery—in some instances from stock.

Full details on request to :

LAURENCE, SCOTT
& ELECTROMOTORS LTD

NORWICH · MANCHESTER · LONDON & BRANCHES

A



FOR NEON AND FLUORESCENT LIGHTING

CLIPS

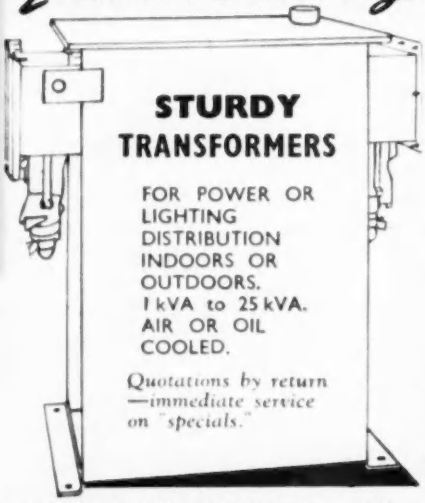
Phosphor bronze neon clips, self-finish or nickel-plated, from 9 mm to 22 mm. Spring steel fluorescent clips, nickel-plated, ½ in. to 1½ in. Also wireman's draw tapes in 60 ft. and 100 ft. lengths.

THE LEWIS SPRING CO. LTD.
Resilient Works, Redditch
Telephone: Redditch 720 1/2

London Office: **322 High Holborn, W.C.1**
Telephone: HOLborn 7479 and 7470

LEAVE IT TO **Lewis** OF REDDITCH

Quicker Delivery



STURDY TRANSFORMERS

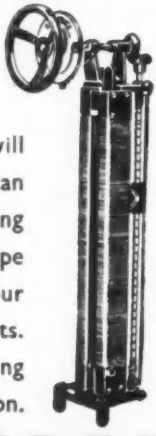
FOR POWER OR LIGHTING DISTRIBUTION INDOORS OR OUTDOORS.
1 kVA to 25 kVA.
AIR OR OIL COOLED.

Quotations by return —immediate service on "specials."

STURDY ELECTRIC CO. LTD.
Burnopfield ('phone 237) Newcastle-on-Tyne

SLIDING **RESISTANCES**

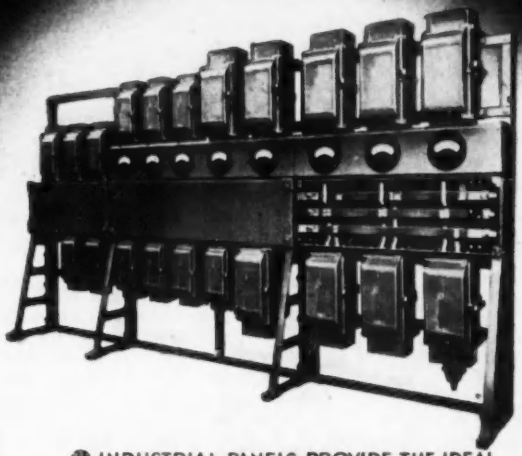
for all purposes



At a price you will approve, CRESSALL can supply you with a Sliding Resistance of the type and size to meet your particular requirements. Make a point of getting in touch with us soon.

CRESSALL

registered Trade Name of—
The CRESSALL MANUFACTURING CO. LTD.
Tower Street, Birmingham 19.
Telephone: ASTon Cross 2666 (3 lines).
Telegrams: OHMIC, BIRMINGHAM



INDUSTRIAL PANELS PROVIDE THE IDEAL MAIN DISTRIBUTION FOR THEATRES, FACTORIES, HOSPITALS, HOTELS AND ALL PUBLIC BUILDINGS

INDUSTRIAL PANELS ENSURE THAT ALL SECTIONS OF AN INSTALLATION ARE UNDER ONE MAIN CONTROL

A SPECIAL TECHNICAL STAFF WILL ASSIST WHERE NECESSARY AND TENDERS WILLINGLY SUPPLIED TO YOUR OWN SPECIFICATION

BILL SWITCHGEAR LTD
ASTON LANE, PERRY BARR
BIRMINGHAM · 20

LONDON	BIRMINGHAM.	N.MIDLANDS.	S.MIDLANDS.	N.WEST.	SOUTH	SCOTLAND
A.W.ZELLEY & R.PRYNE.	C. BAKER.	G.H.GARBETT.	C.G.BACHELOR.	H.H.POLLARD.	W.L.WHITE.	J.D.HARRIS

1912

1950

Aerial Picture of Works

The Story of **BELLING** *& Company Ltd.* No. 19

In the last chapter I mentioned our recent new extension and this is shown in the above aerial picture, the extension being that part with the white roof on the right. I am glad to say this extension is now practically complete with its lighting, heating and power installations, and we are rapidly moving over into it.

However, I am still actually dealing with what we did in 1949, and one interesting departure was that we started advertising direct in certain U.S.A. Home Magazines. We illustrated our imitation log fires for the hearth and we are very pleased with the results we have had, and we are, in fact, extending the idea. These imitation log fires are not seriously manufactured in America so for the present, at any rate, we have a very good line to offer. Orders have been really surprising, bearing in mind that the customer has to send his cheque with order and take everything on trust. We then do the rest so that the system is simple, and if sent by air mail we can almost deliver as quickly as a home producer.

During this same year, that is 1949, we put several new appliances on the home market. Our Food and Plate Warming Cabinets were typical and successful examples. We make them in two sizes, the large one for industrial canteens, snack bars and similar purposes, and the small size is specially designed for domestic use, and is a great asset in any home. Everyone knows how difficult it is to warm the plates when the oven is already full up with food being cooked.

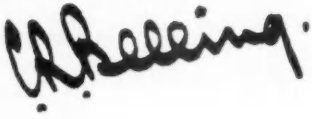
We also started a new series of Clothes' Drying Cabinets, and these, too, have been very successful, and there is an excellent demand for them. They are a first-class job, look nice and are very efficient.

Our original Champion Heater is another item which has had attention and has been completely re-designed. It is now particularly attractive in appearance and is even much more efficient in use than before.

Just recently, too, we have put our "Homeguard" Fire on the market. It is fitted with a mercury switch and when the fire is lifted or if it is accidentally knocked over, the electricity is automatically switched off. Also it has a close mesh guard, similar to our original "Visor" Fire, to prevent the heating elements being touched. It is rather novel in design, of strong construction, and one of the most practical fires on the market today.

Breaking away from Belling and Co., for a moment, I might mention that in the early part of 1950 I joined in with Mr. Marques in another new Company called "Erecon Limited." This was formed to undertake complete street lighting installations, including erection of lighting columns and overhead transmission poles of all kinds, and the necessary road work and wiring up equipment where required. We have a first-class fleet of mobile cranes, pneumatic diggers, concrete mixers, cable drawing equipment, trench excavators and all other necessary equipment for carrying out this class of work. Our order book is excellent and we look forward to big business.

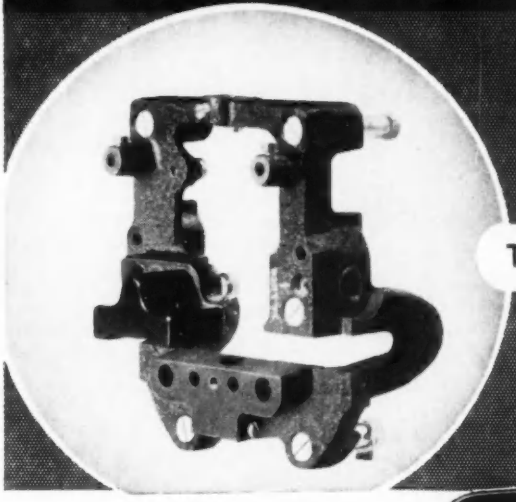
This brings me to the end of the space I have available, and Chapter No. 20 which will be appearing in early January will be giving some further interesting information in connection with Belling and Co. Ltd., and a few notes as to what we hope to achieve in 1951.



Belling & Co., Ltd., Bridge Works, Enfield, Middx. Tel.: Howard 1212.

CRC 19

A NEW STANDARD IN METERS



F
FERRANTI

THE MAIN FRAME

FM97

The main frame is a robust casting made in the Ferranti foundry. The driving and braking systems are attached to it by dowels giving great stability to the meter's performance and ensuring similarity of performance in individual meters. It provides an excellent magnetic screen between the driving and braking systems.

FERRANTI LTD., Hollinwood, Lancashire.
London Office: Kern House, Kingsway, W.C.2

FERRANTI
F m Meter

with simple tools and

DEXION
SLOTTED ANGLE

. . . you can save pounds in equipment costs

At last, the idea you have been waiting for! Cut costs, eliminate delays, get more value than ever before from your existing space by making up your own equipment with Dexion Angle. Any unskilled person can do it with only simple tools, for Dexion is already slotted for bolting together. It's as easy to use as "Meccano."

MANY USES

All kinds of equipment can be quickly assembled that might take weeks or months to get from outside suppliers—and at a remarkable saving in cost. It can be built to the exact size you want, taking full advantage of odd shaped spaces and corners—for example, above existing structures and machines.

EVERLASTING

Dexion Angle is amazingly rigid and needs no bracing. You can use it over and over again for different purposes—it never deteriorates.

Try Dexion once and you will never be without a stock. It will prove its value to you many times over—you will think of dozens of uses for it from the moment you get it. Send for further details and opinions of well-known users.

A small stock of DEXION ANGLE makes a van load of equipment.

Send for illustrated folder D.3. Better still, see an actual installation of Dexion at 34, Fouberts Place, W.1 (near Liberty's)—*No appointment necessary.*

DEXION LTD. **Triumph House, 189 Regent Street, London, W.1.**

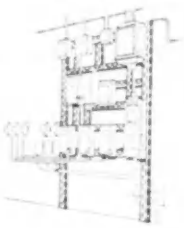
Telephone: REGENT 4841-5. *Grams:* DEXION, PICCY, LONDON.

Dexion Angle is protected by Brit. No. 620,696 and world patents.

There are dozens of uses for DEXION ANGLE in your firm

STORAGE RACKS

MACHINE GUARDS | WORK BENCHES



TROLLEYS | SWITCHGEAR MOUNTS

SECTIONS BUILT UP OF DEXION ANGLE
Single angle is immensely strong but for even greater strength it may be bolted into sections as above.

T.A.2940

THIS MARK

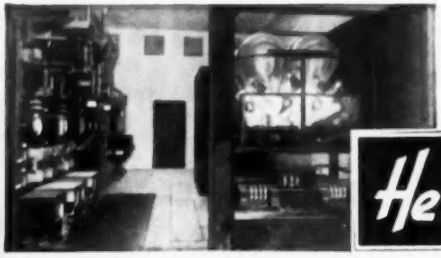
TO BE SURE

A.S.C.M. MEMBERS ARE AS FOLLOWS:

- **Alma & Cranmore Tube Co. Ltd.**
- **Barlow, H. J. & Co. Ltd.**
- **Electrical Conduits Ltd.**
- **General Electric Co. Ltd.**
- **Griffiths, Isaac & Sons**
- **Hildick & Hildick**
- **McDougall, James, Ltd.**
- **Metallic Seamless Tube Co. Ltd.**
- **Monmore Conduits Ltd.**
- **Simplex Electric Co. Ltd**
  - Comprising:
  - Credenda Conduits Co. Ltd.
  - Perfecta Tube Co. Ltd.
  - Simplex Conduits Ltd.
  - Stella Conduit Co. Ltd.
- **Steel Tube & Conduit Co. (Middlesbrough) Ltd.**
- **Talbot-Stead Tube Co. Ltd.**
- **Tipper Bros. (Bilston) Ltd.**
- **Walsall Conduits Ltd.**

Advert of the
ASSOCIATION of STEEL CONDUIT MANUFACTURERS
21 Waterloo Street
Birmingham, 2

Complete RECTIFIER SUBSTATION EQUIPMENTS comprising



Hewittic equipped rectifier substation 1,000 kw. supplying Reading Corporation trolley buses.

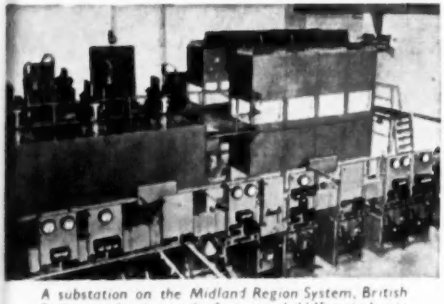
Hewittic Rectifiers

REGD. TRADE MARK

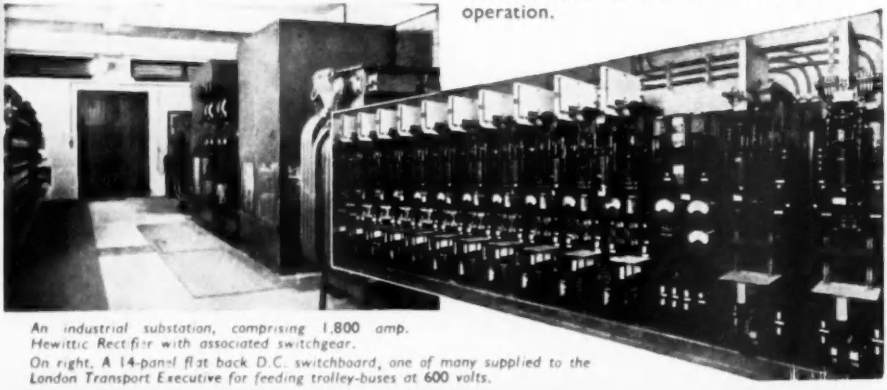
and associated switchgear

Hackbridge and Hewittic Electric Co., Ltd., has been responsible for the supply of complete equipment for a very large number of rectifier substations, including in each case not only the Hewittic Rectifier—simplest, most reliable of all converting plant—but also the whole of the H.V. and L.V. switchgear.

The Company will gladly offer its advice and quotation for complete equipment, with the assurance—from long experience—of a thoroughly satisfactory installation, modern in lay-out and efficient and trouble-free in operation.



A substation on the Midland Region System, British Railways, showing in the foreground, H.V. switchgear and, in the background, Hewittic rectifier and high speed D.C. switchgear.



An industrial substation, comprising 1,800 amp. Hewittic Rectifier with associated switchgear.

On right, A 14-panel flat back D.C. switchboard, one of many supplied to the London Transport Executive for feeding trolley-buses at 600 volts.

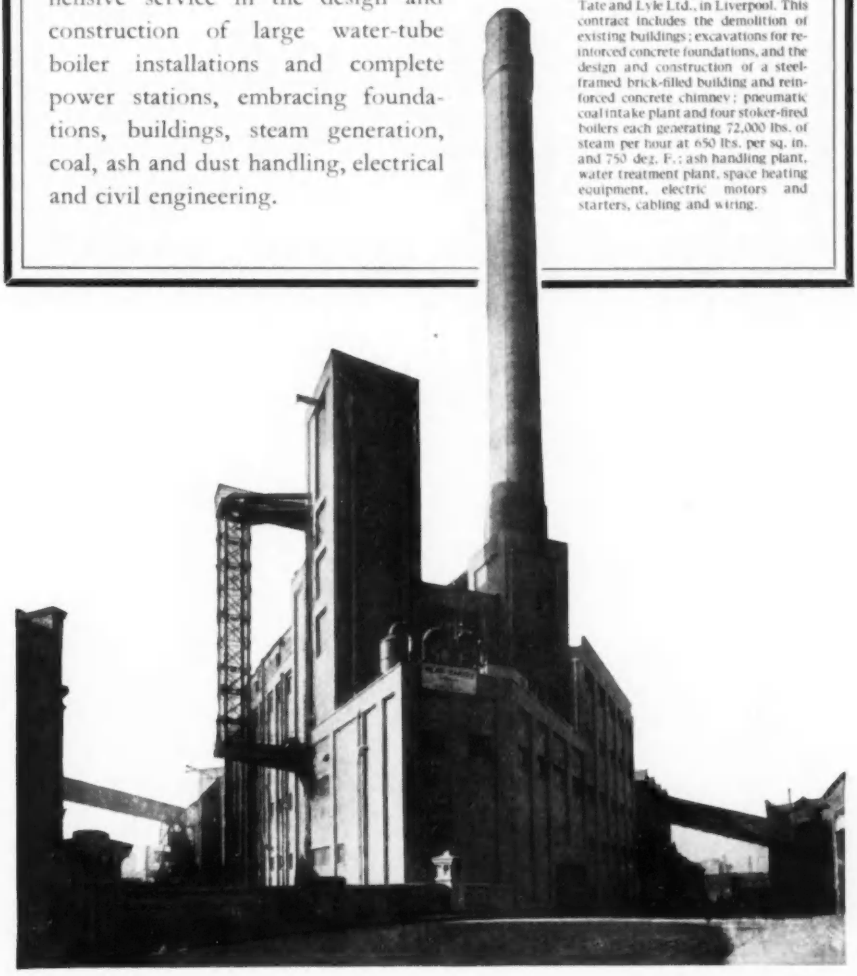
HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

Designers and Builders of complete Steam Power Plants

Simon-Carves provide a comprehensive service in the design and construction of large water-tube boiler installations and complete power stations, embracing foundations, buildings, steam generation, coal, ash and dust handling, electrical and civil engineering.

TATE & LYLE LTD, LIVERPOOL
The photograph shows a typical contract nearing completion for Messrs. Tate and Lyle Ltd., in Liverpool. This contract includes the demolition of existing buildings; excavations for reinforced concrete foundations, and the design and construction of a steel-framed brick-filled building and reinforced concrete chimney; pneumatic coal intake plant and four stoker-fired boilers each generating 72,000 lbs. of steam per hour at 650 lbs. per sq. in. and 750 deg. F.; ash handling plant, water treatment plant, space heating equipment, electric motors and starters, cabling and wiring.



Steam power by **Simon-Carves Ltd** SIMON ENGINEERING GROUP

STOCKPORT ENGLAND

MORE POWER TO AUSTRALIA

38 MELESCO SUPERHEATERS ARE INCORPORATED IN THE BOILERS NOW UNDER CONSTRUCTION FOR POWER PLANT AT:

BUNNERONG "B"
TALAWARRA
4 SIMON CARVES BOILERS

MORWELL
BRIQUETTING WORKS
5 MITCHELL ENGINEERING BOILERS

PYRMONT
EAST PERTH
FREMANTLE
13 INTERNATIONAL COMBUSTION BOILERS

NEWPORT "C"
YALLOURN "C"
YALLOURN "D"
16 JOHN THOMPSON BOILERS

(AGGREGATE EVAPORATION 8,530,000 LB. PER HOUR)

The **SUPERHEATER** *Company Ltd*

The Authority on Superheated Steam

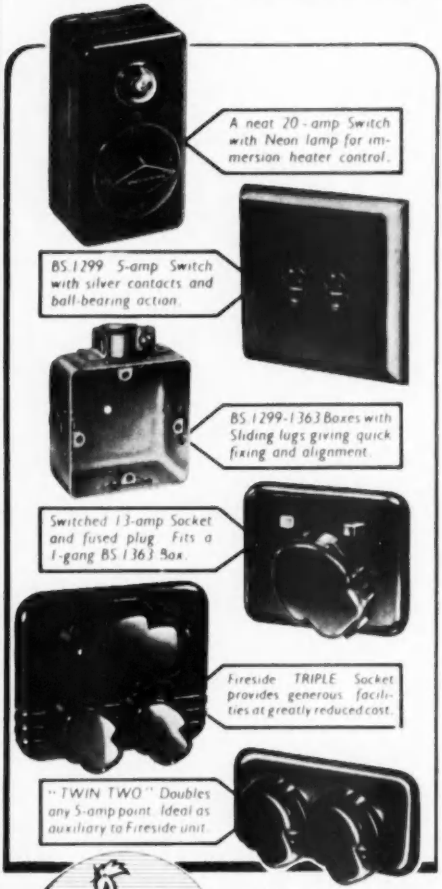
53 HAYMARKET, LONDON, S.W.1

ALSO

THE SUPERHEATER COMPANY
(AUS.) PTY. LTD.
MANCHESTER UNITY BUILDING
185 ELIZABETH STREET, SYDNEY, N.S.W.

BA.50

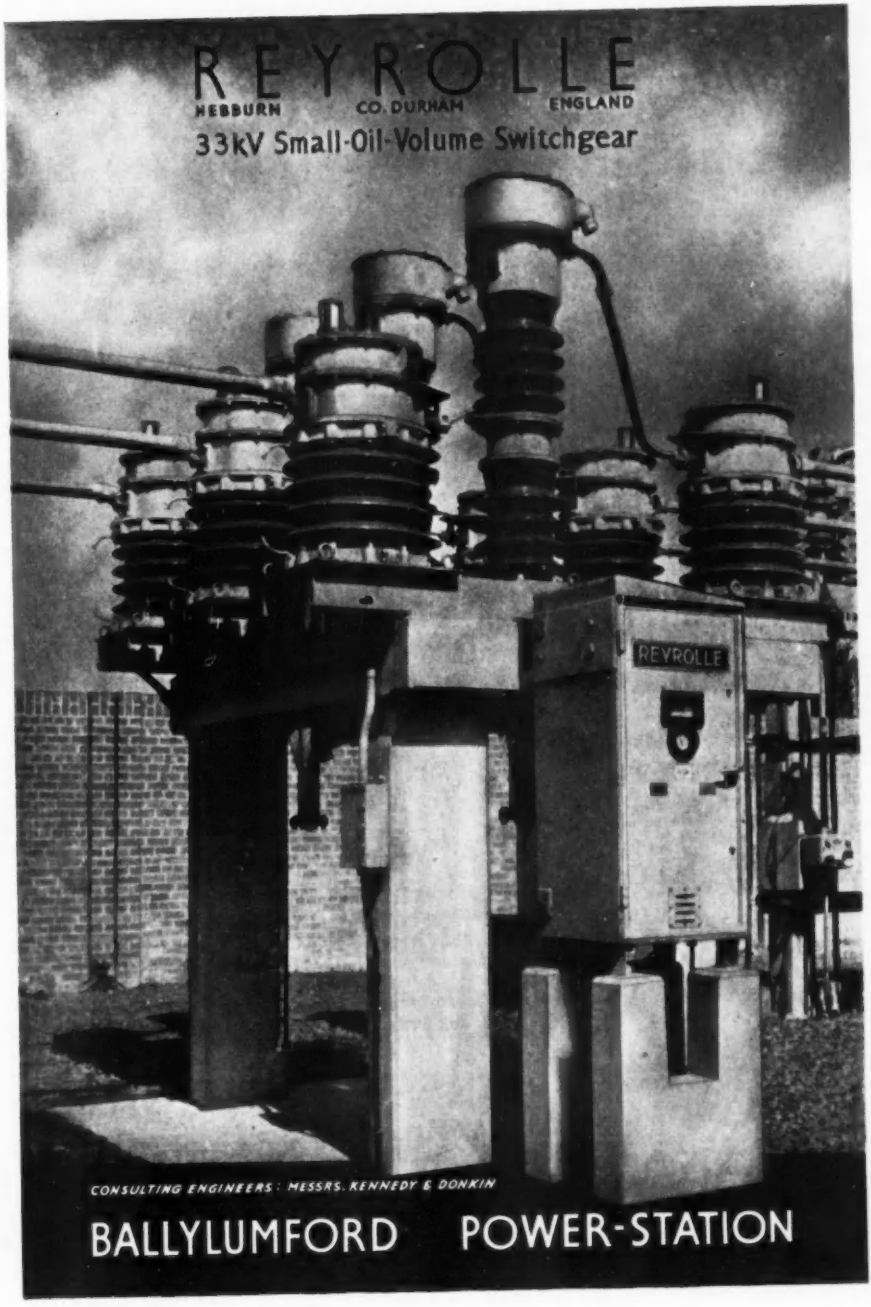
Off with the old– On with the NEW!


A neat 20-amp Switch with Neon lamp for immersion heater control.
BS.1299 5-amp Switch with silver contacts and ball-bearing action.
BS.1299-1363 Boxes with Sliding lugs giving quick fixing and alignment.
Switched 13-amp Socket and fused plug. Fits a 1-gang BS.1363 Box.
Fireside TRIPLE Socket provides generous facilities at greatly reduced cost.
"TWIN TWO" Doubles any 5-amp point. Ideal as auxiliary to Fireside unit.

NEW DAY

New Day accessories combine exceptional electrical and mechanical performance with valuable labour-saving features and a discreet styling which lends character to any domestic installation.

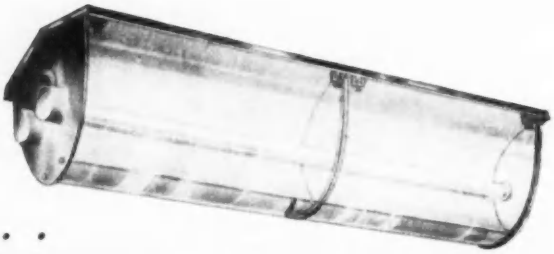
NEW DAY ELECTRICAL ACCESSORIES LTD
136-8 MARY STREET, BIRMINGHAM, 12


REYROLLE
HEBBURN CO. DURHAM ENGLAND
33kV Small-Oil-Volume Switchgear
REYROLLE
CONSULTING ENGINEERS: MESSRS. KENNEDY & DONKIN
BALLYLUMFORD POWER-STATION

Another

'SOL-ETERN'

Installation . . .



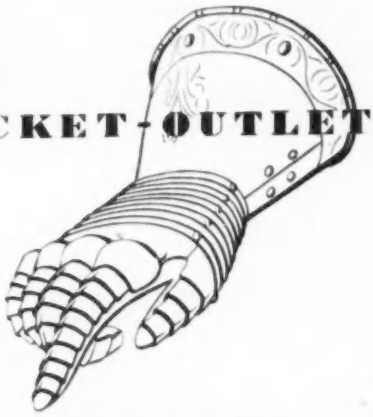
The above photograph shows Guildford 'bus station by night. The desirability for such a situation to be well illuminated is obvious, and our illustration can only do partial justice to the excellent results obtained from Revo (3-lamp) "Sol-etern" lanterns mounted on Revo "Regent" columns which form this installation. "Sol-etern" lanterns are made with 2, 3 or 4, 80w. fluorescent lamps for Group A roads; and with 2, 20w. or 2, 40w. lamps for Group B roads.

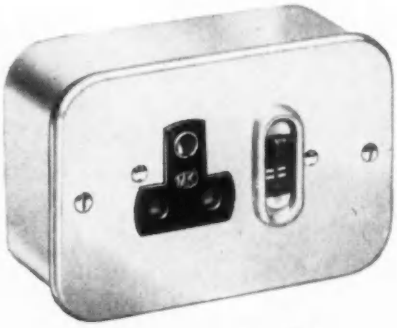
Revo

STREET LIGHTING EQUIPMENT

REVO ELECTRIC CO. LTD., TIPTON, STAFFS.

M.K. METALCLAD SWITCHSOCKET-OUTLETS





Introducing a new range of metalclad switchsocket-outlets and plugs of remarkable value. They incorporate the latest type of A.C. switches, shuttered sockets, and are mounted in pressed steel boxes. Leading features include A.C. type switches incorporating pure silver contacts. Simple and reliable shutters with snap action. Boxes made in one piece from zinc-coated steel, bonderized and finished aluminium. Four $\frac{3}{4}$" knockouts, one on each side. Front plates — protected type, aluminium finish. Domestic type, brass, finished matt bronze. Bases, urea moulding of non-tracking type.

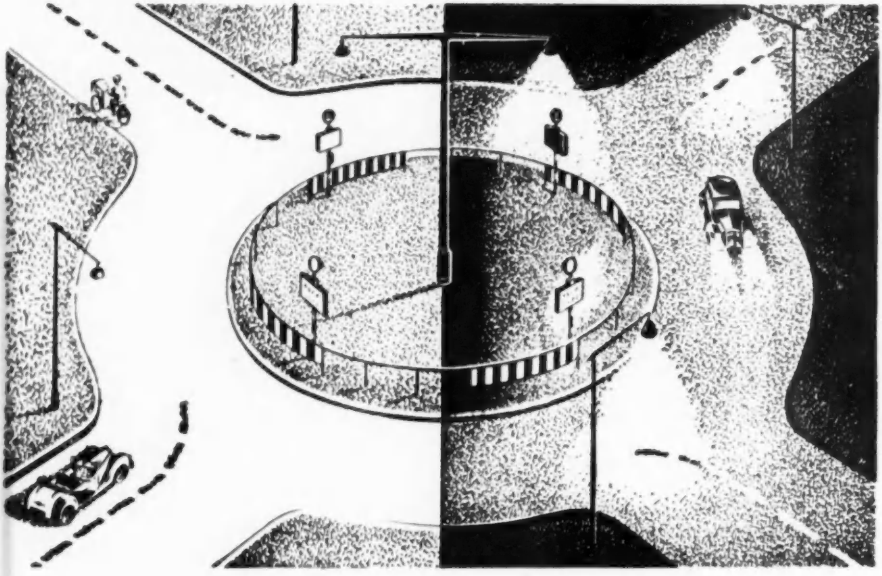
M. K. ELECTRIC LIMITED

WAKEFIELD STREET · EDMONTON · LONDON · N.18

Telephone: Tottenham 5151 (6 lines). Telegrams: Multiconta, Southtot, London

A.31

A NEW DEVELOPMENT IN AUTOMATIC LIGHTING CONTROL



● MAGNETIC AMPLIFIER—HAS NO VALVES ● NEVER NEEDS ADJUSTING OR RE-SETTING ● REDUCED MAINTENANCE COST

Elliott photo-electric switching cuts the labour cost of street lighting—lights up whenever daylight fails, in good time, every time. Absolutely reliable, even after supply cuts, and needs no attention. Outstanding features include sealed barrier-layer photo-cell and robust, weatherproof magnetic amplifier.

Low impedance circuit puts no limit to distance from cell to control unit and simplifies installation. Mercury switch eliminates contact troubles. Switching capacity 2 KVA.

Extended field tests have proved the value of the Elliott Controller, especially for traffic signs on isolated sites. Automatic illumination in fog or dark conditions is a vital safety measure.

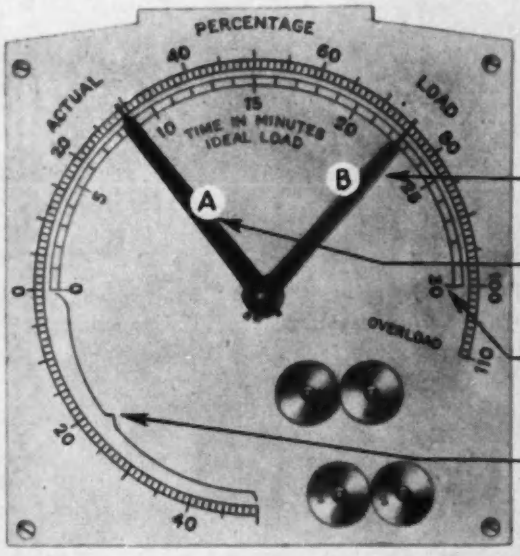
ELLIOTT

AUTOMATIC LIGHTING CONTROLLER

Ask for publication G033A

ELLIOTT BROTHERS (LONDON) LTD., CENTURY WORKS, LEWISHAM, LONDON, S.E.13

Reduce Maximum Demand Charges . . .



This pointer shows the load you must not exceed.

This pointer shows the the load you are taking.

Pointer B resets to O on reaching this position.

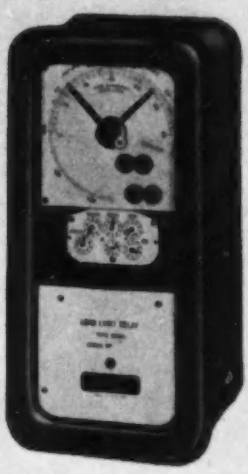
Pointer A resets to a pre-arranged point on this scale at end of each half-hour period.

If pointer (A) overtakes pointer (B) during any ½ hour period—load must be shed, until pointers are running together.

(1) An audible warning calls attention to the need for this to be done—

OR

(2) —relays operate to effect automatic load reduction.



. . . with

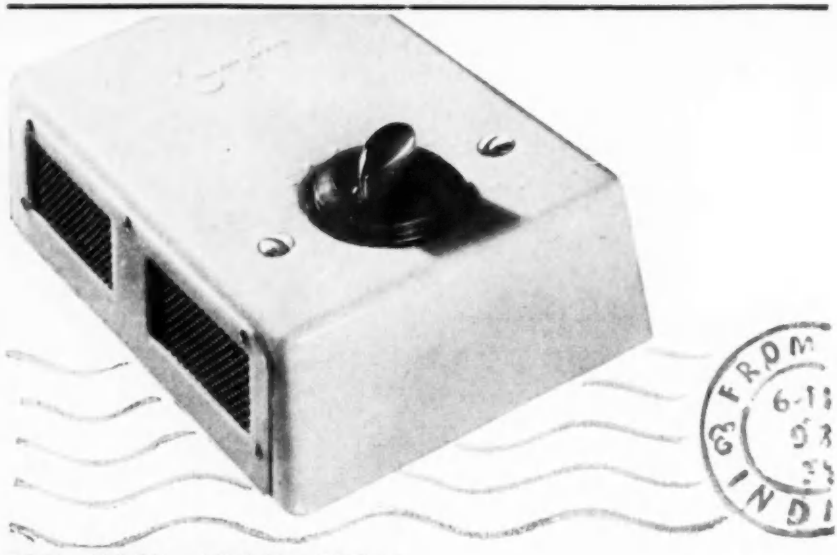
the Metrovick

LOAD LIMITER

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER 17

Member of the A.E.I. group of companies

METROVICK *for Instruments, Meters and Relays*



FAN-MAIL FROM INDIA

The parts of this Crompton-Parkinson fan regulator housing have to be moulded within carefully defined limits and a high finish is required of the external components.

Although it represents a straightforward compression moulding job, details such as the ingenious design of the air vent claim attention. This consists of wire gauze held between two moulded plates, the whole being assembled as a single unit. In addition to the housing and control knob, there is an internal contact plate having metal inserts.

These mouldings, simple in themselves, nevertheless underline Streetly **RELIABILITY**. We have been moulding them for Crompton-Parkinson Ltd. for 13 years, during which our customer has received many thousands of orders from India and the Middle East. During that long period our own high standard of moulding and finishing and meticulous system of inspection have contributed significantly to our customer's own smooth production. Even if we mould a small percentage of rejects (and who doesn't), the customer never sees them. *We* weed them out, *before* delivery.

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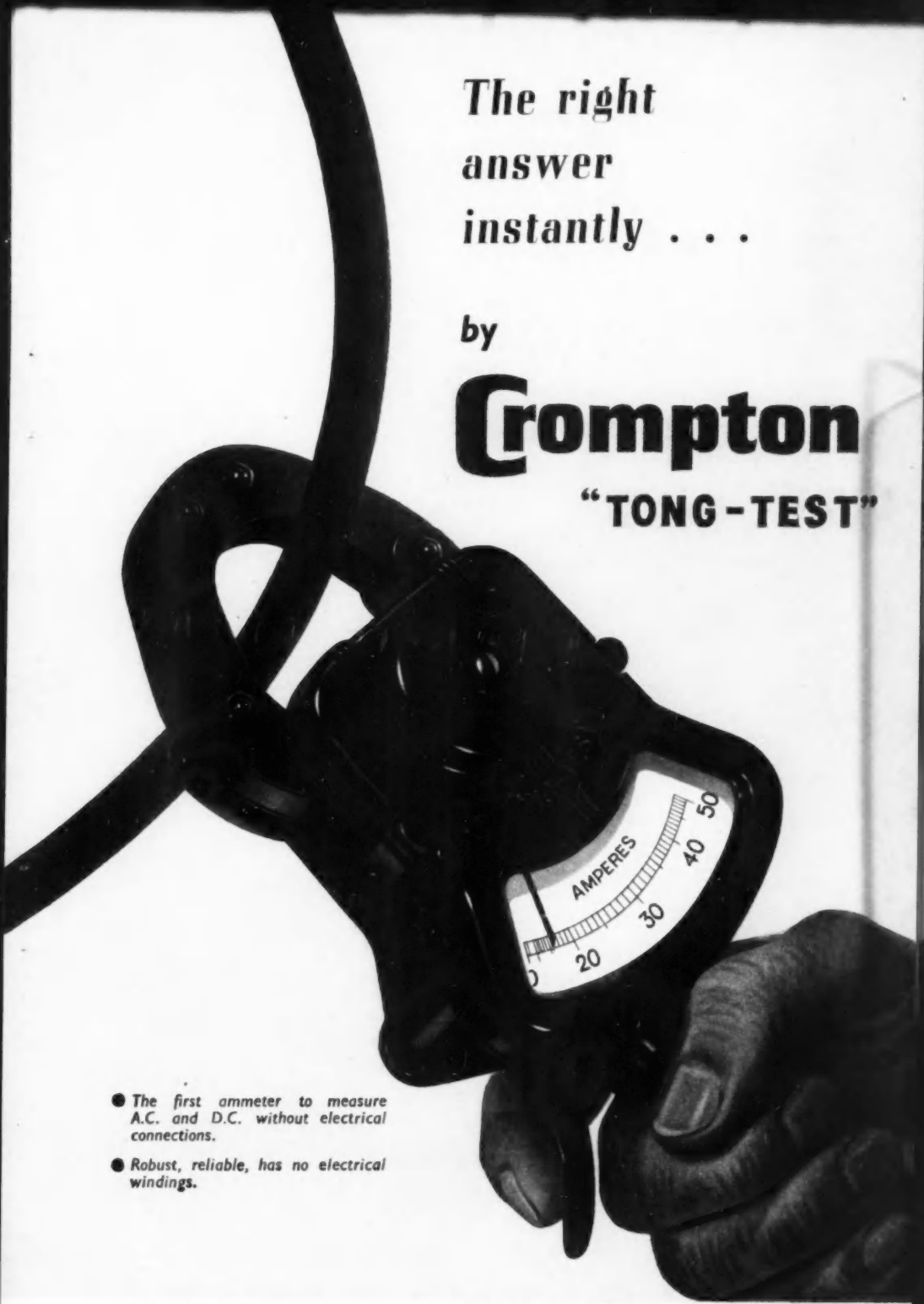

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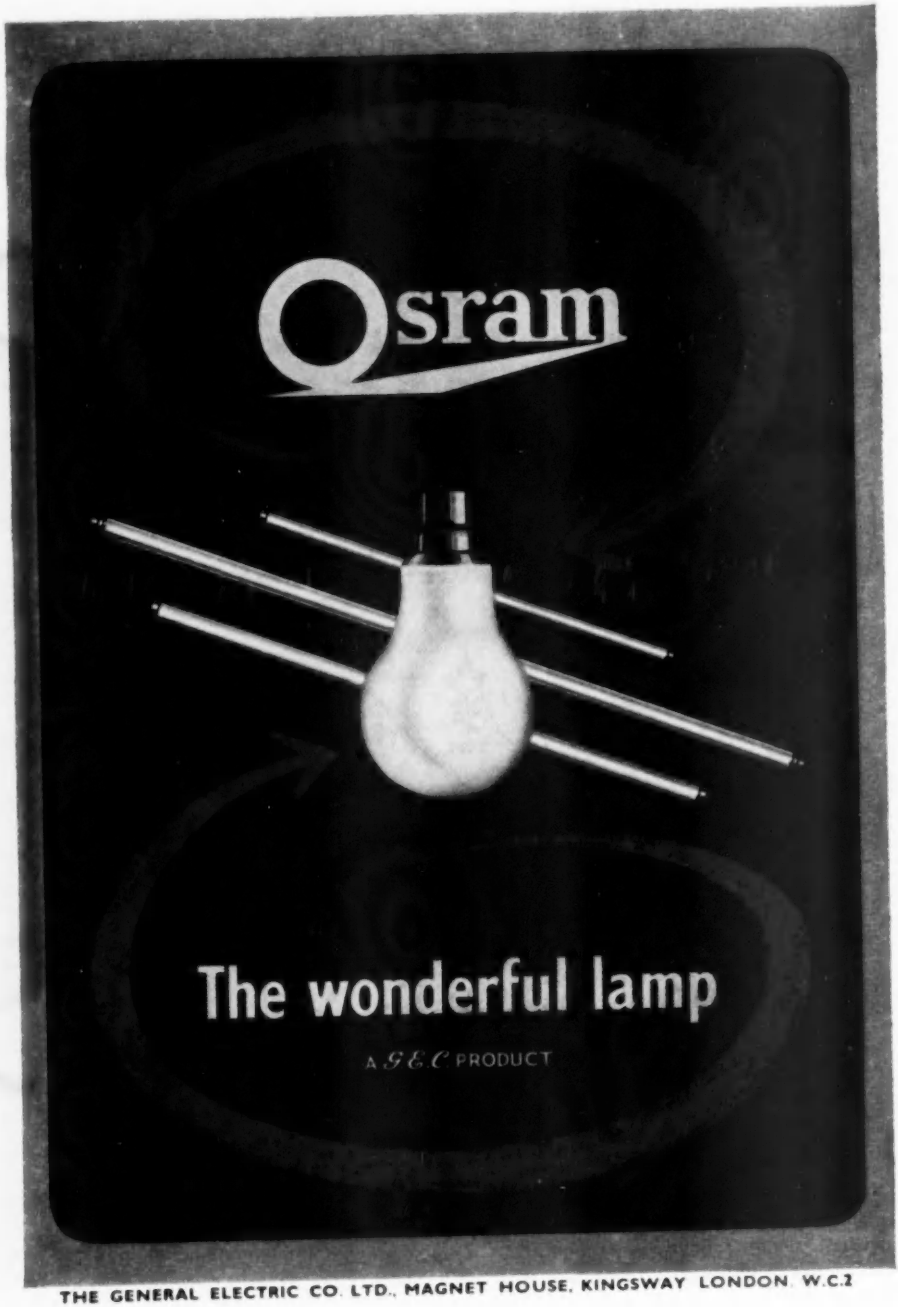

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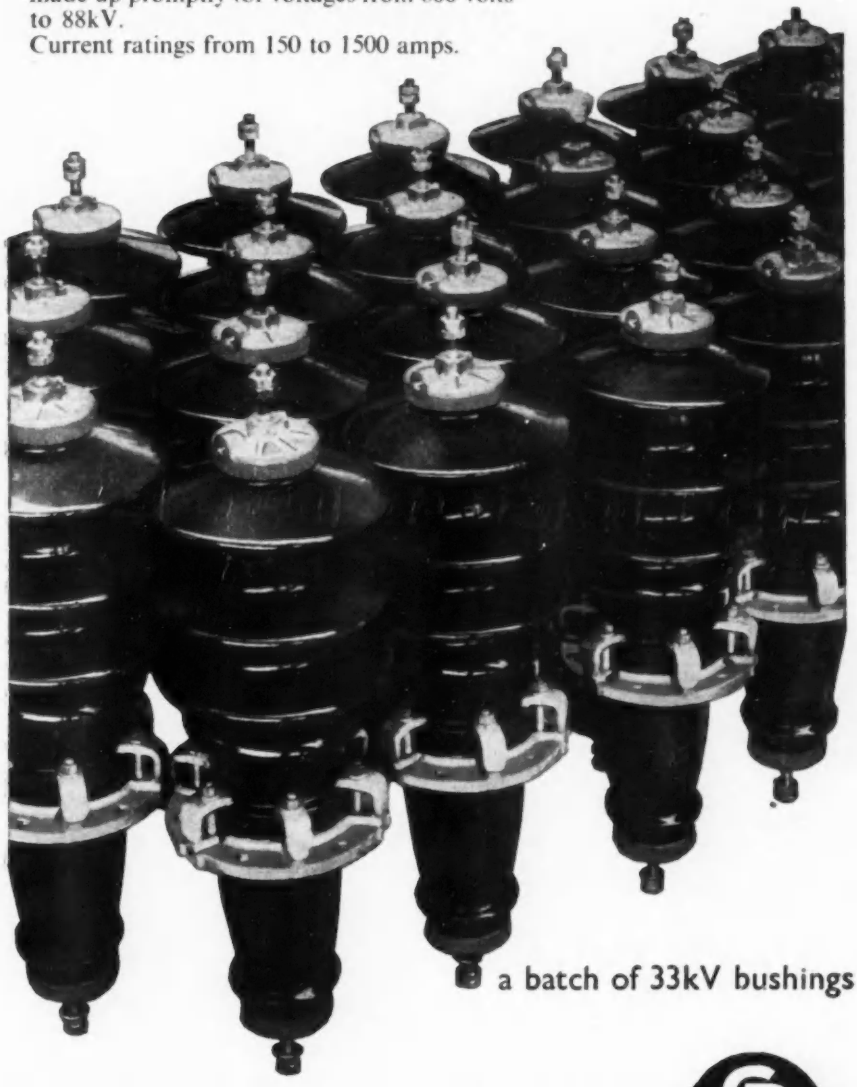

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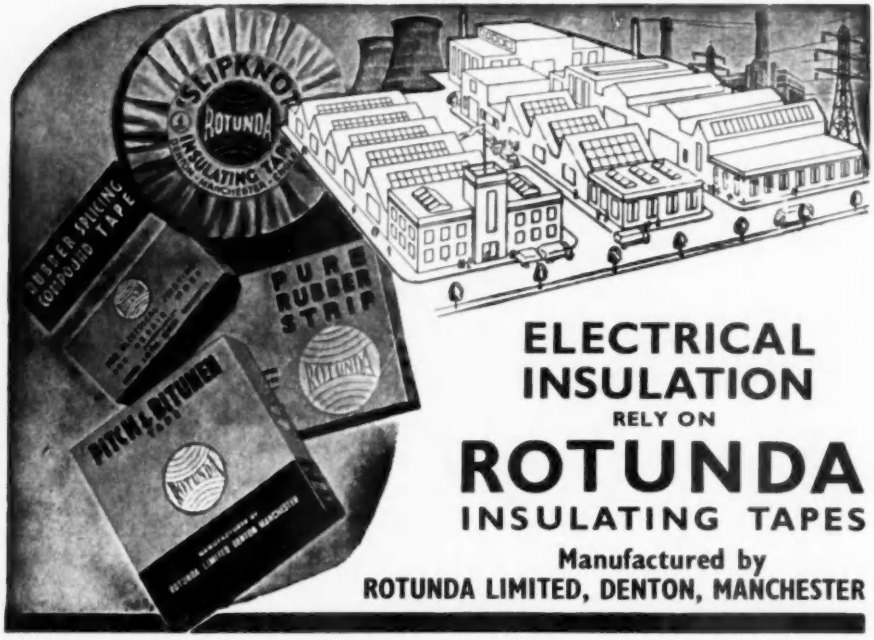

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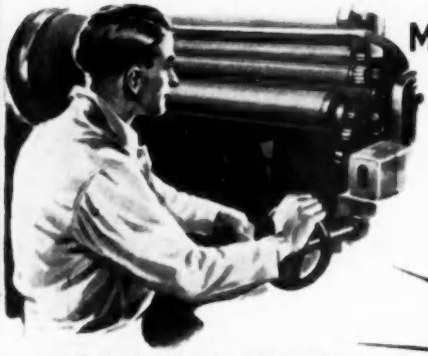

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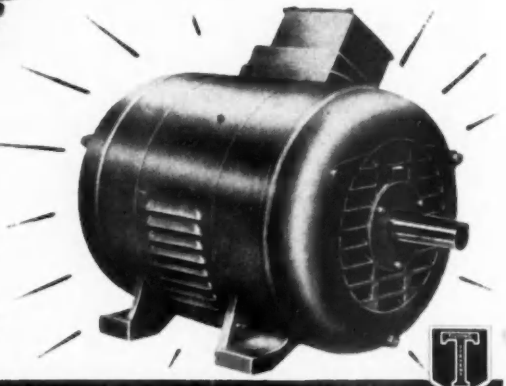

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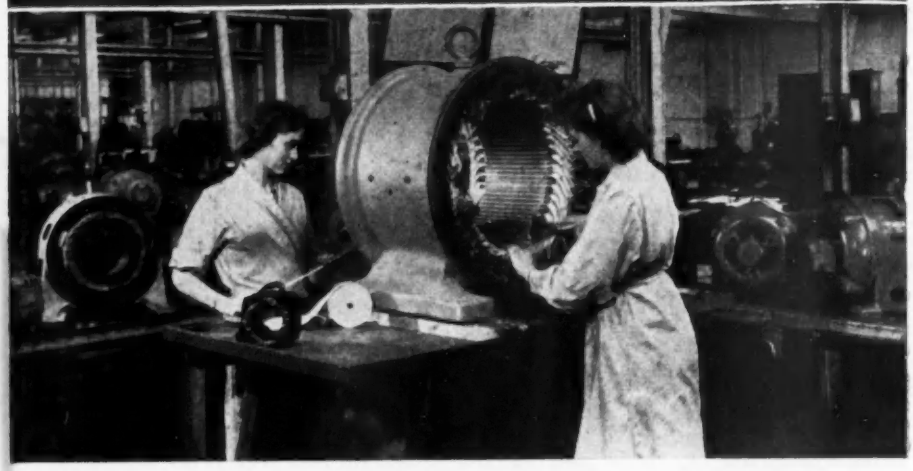

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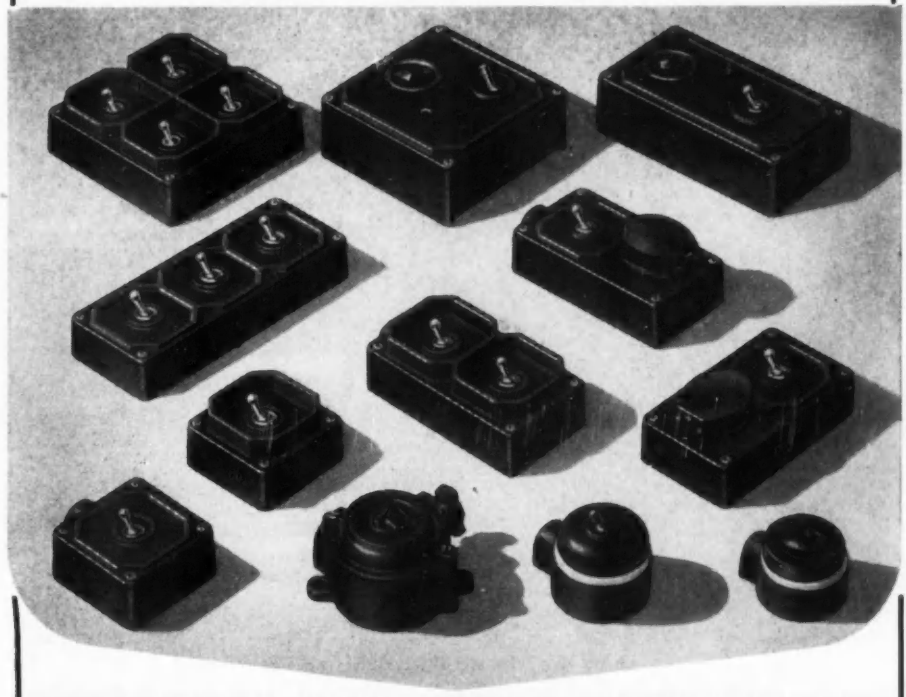

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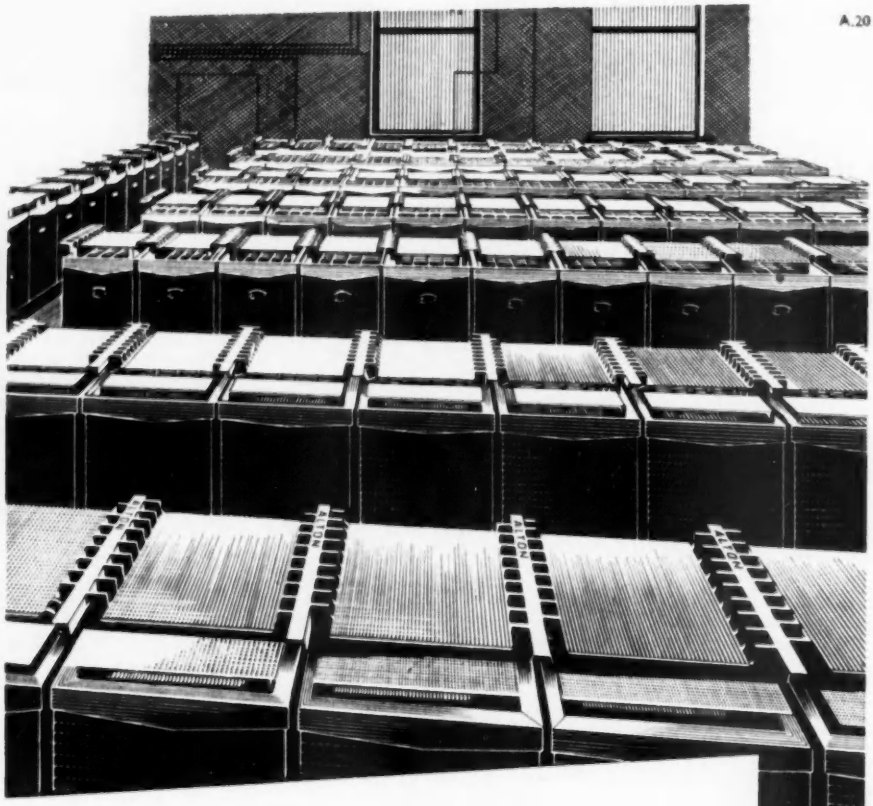

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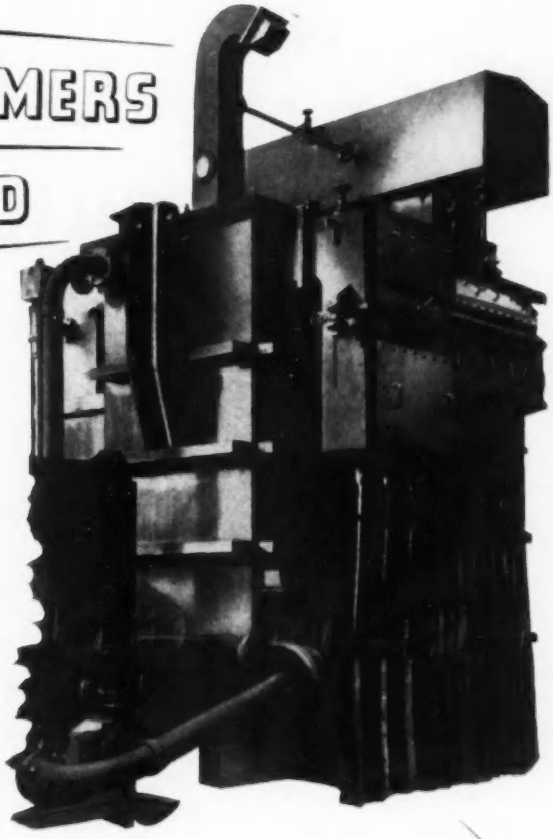

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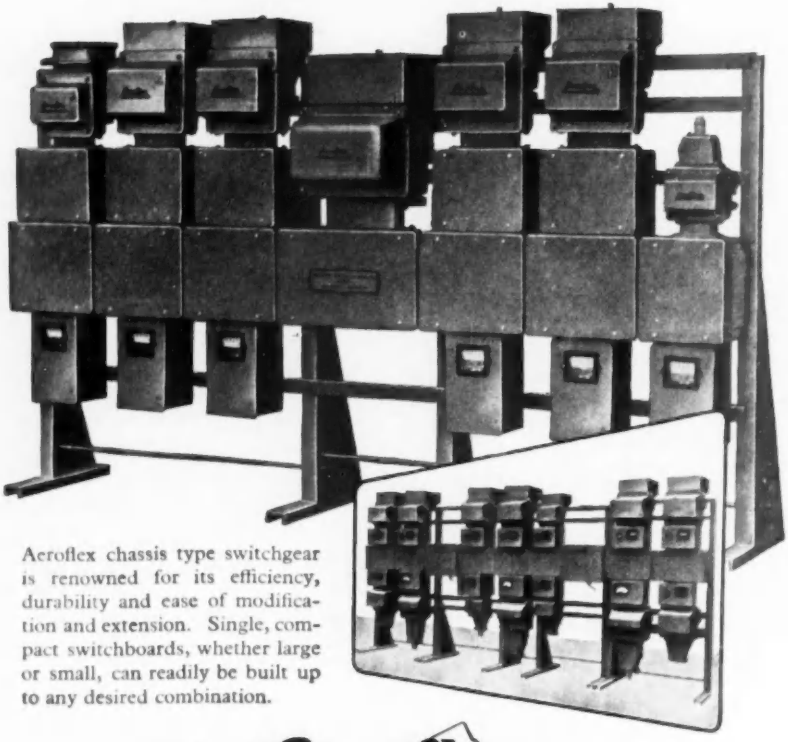

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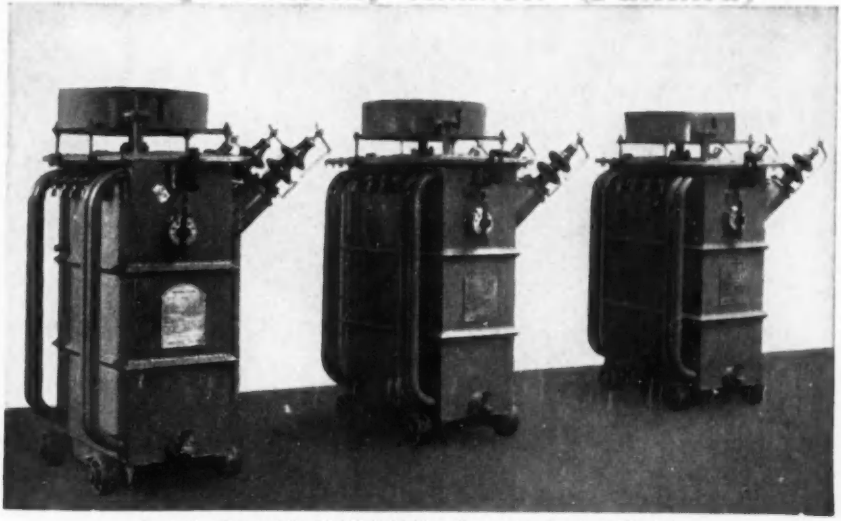

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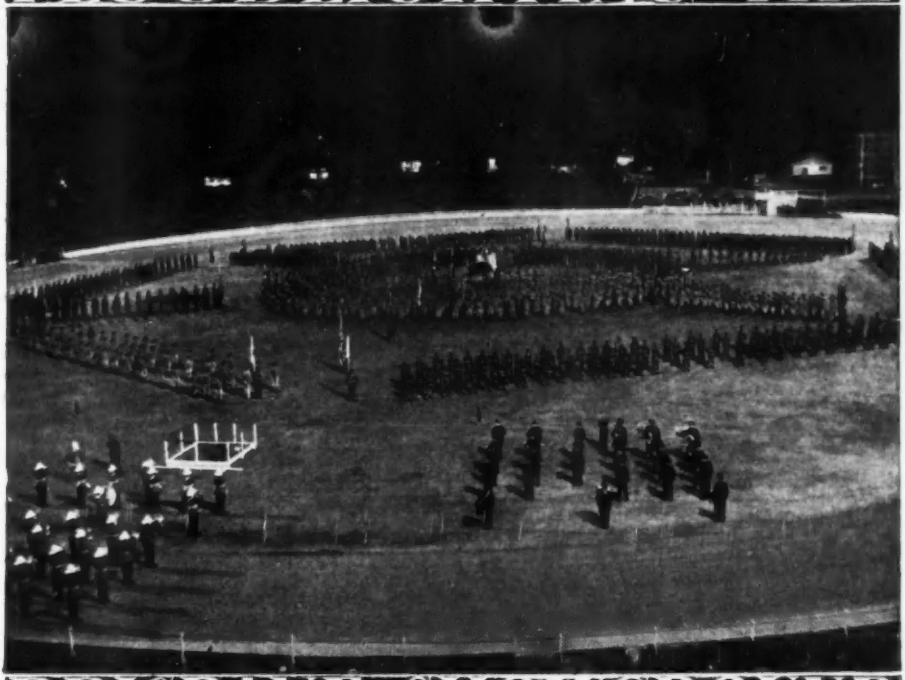

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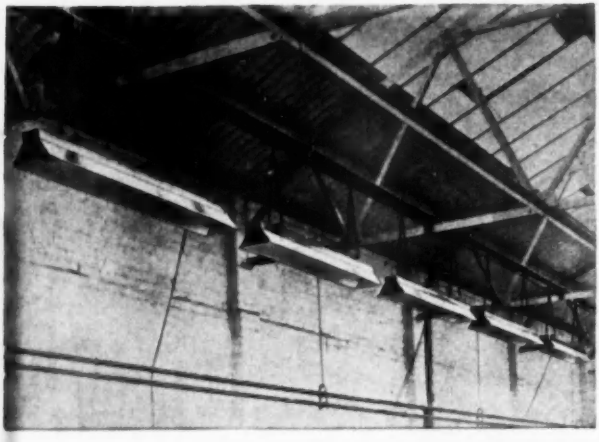

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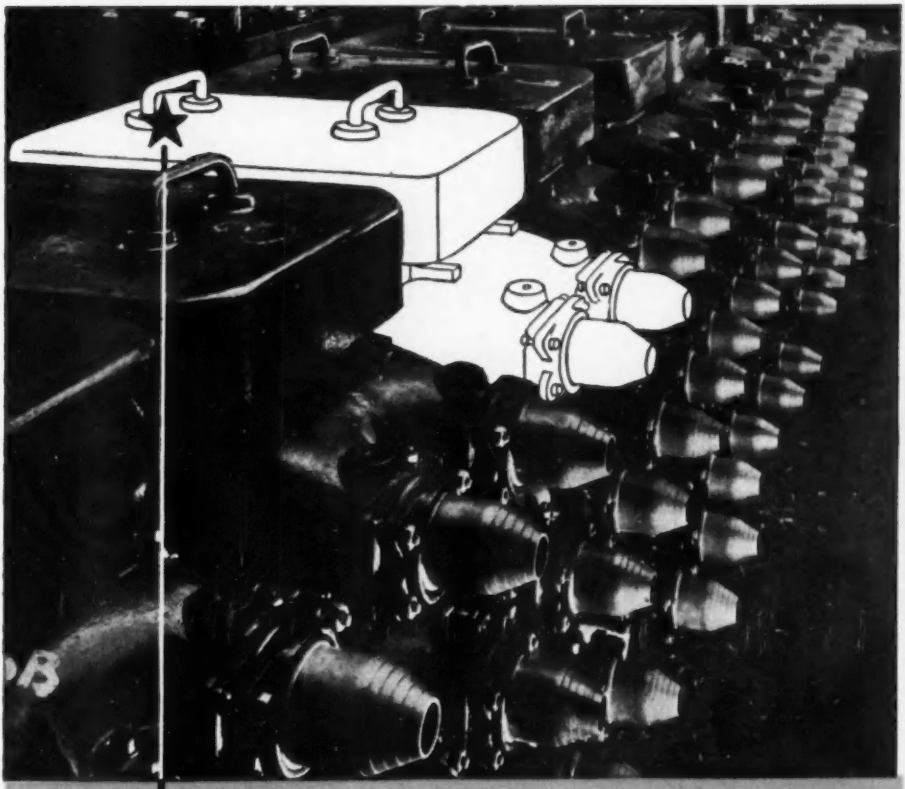

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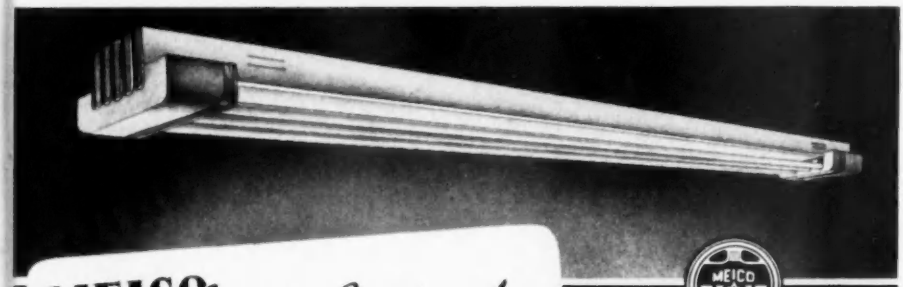

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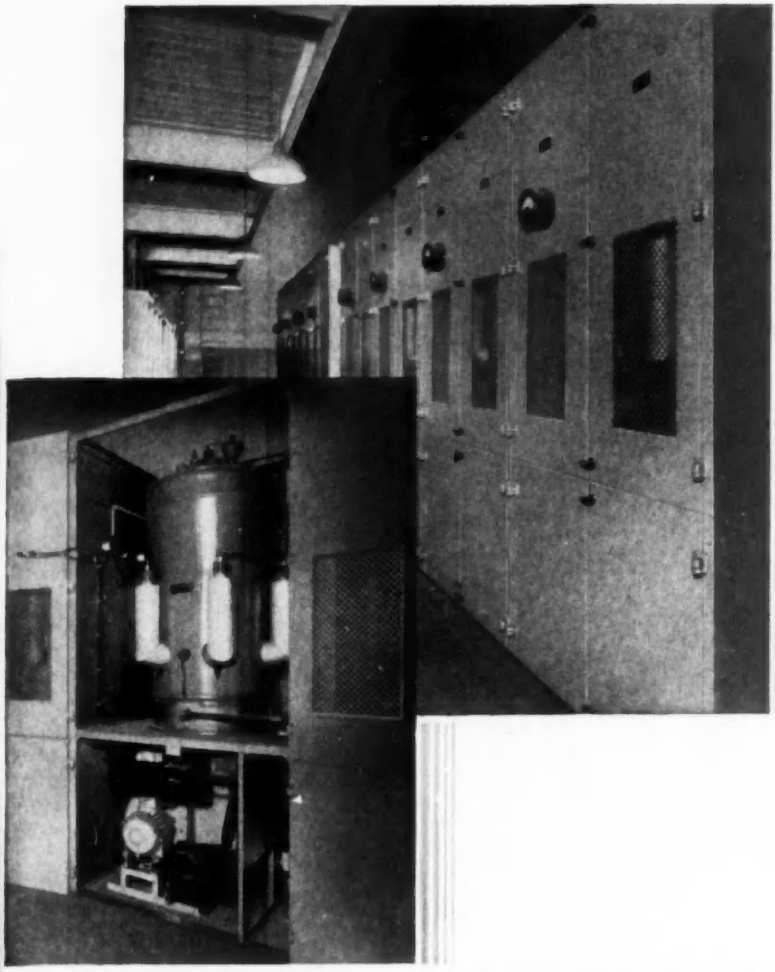

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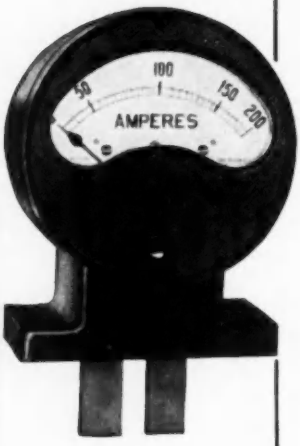

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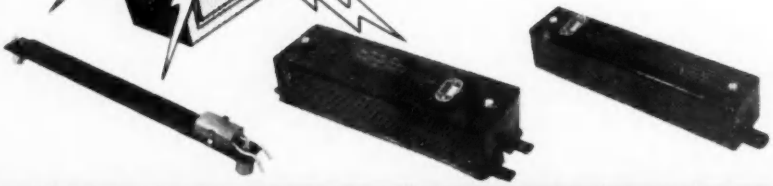

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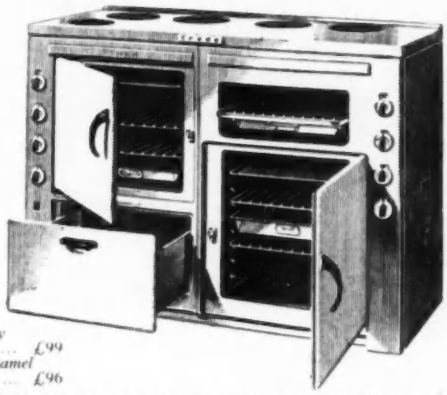
CHOOSE THE

Creda restaurant range



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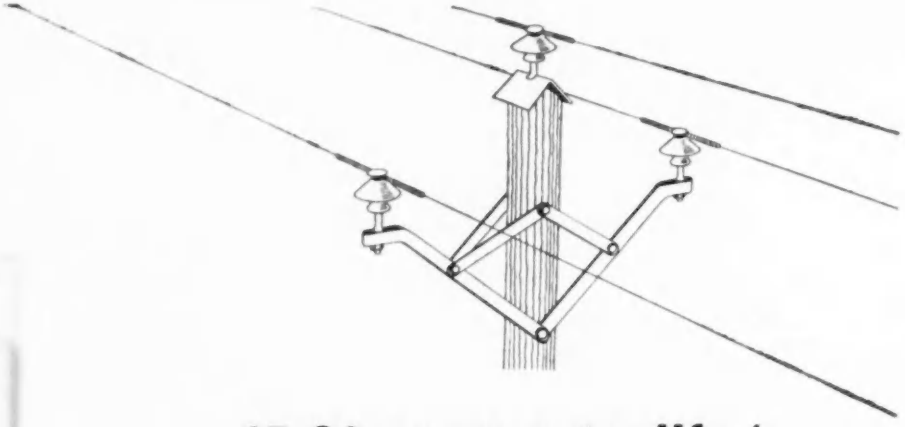

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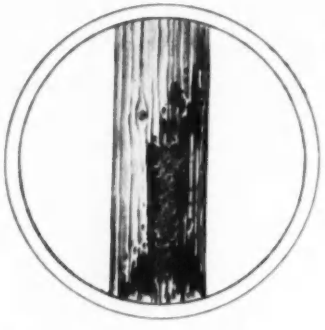

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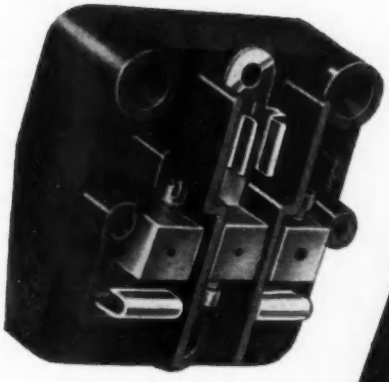

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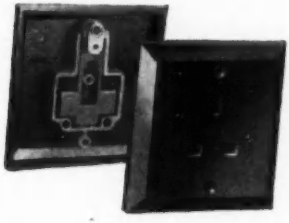

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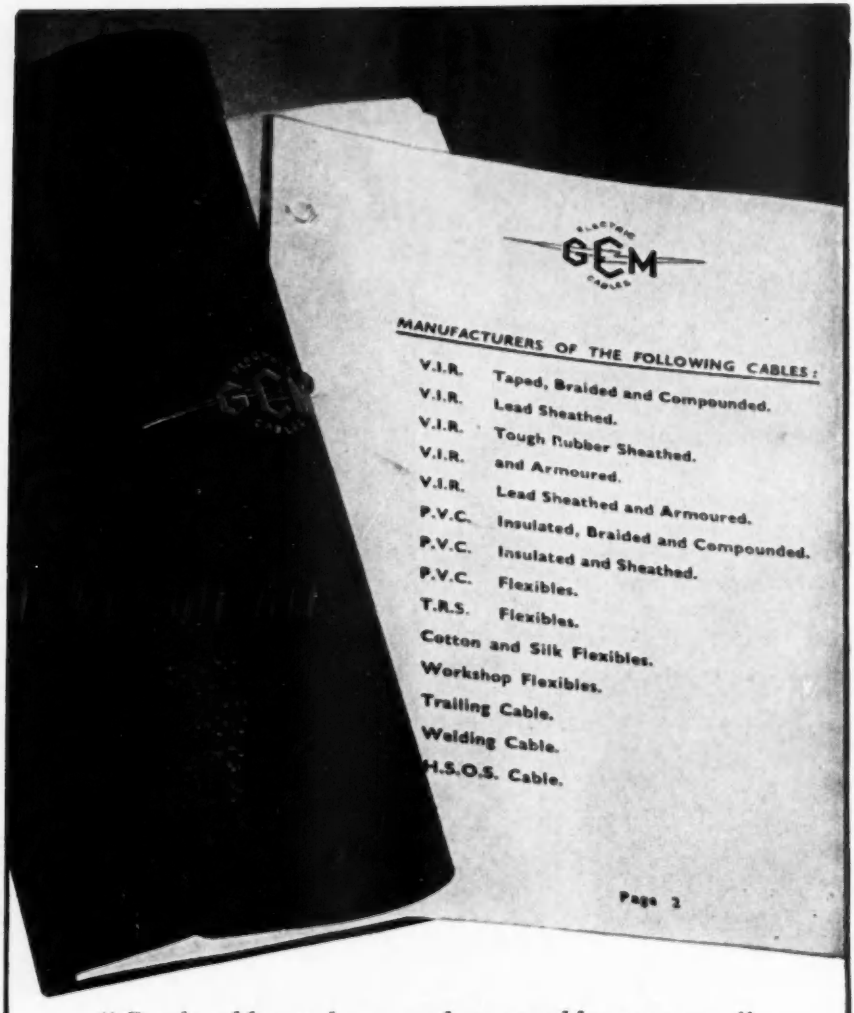

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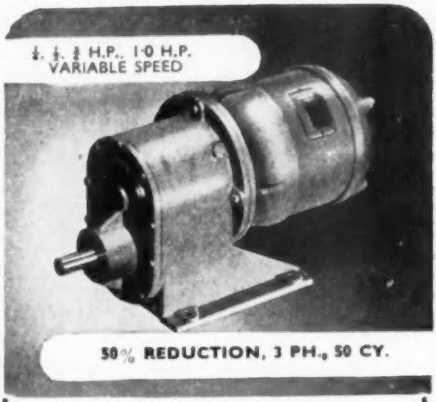

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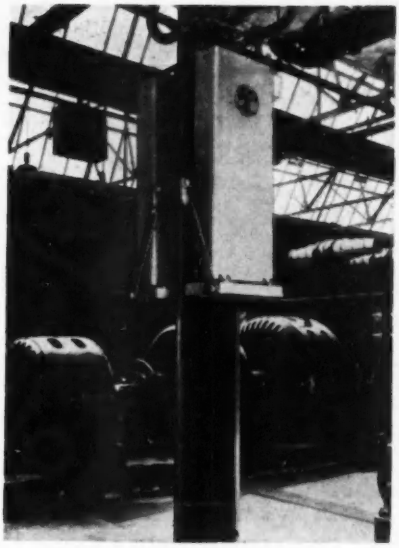

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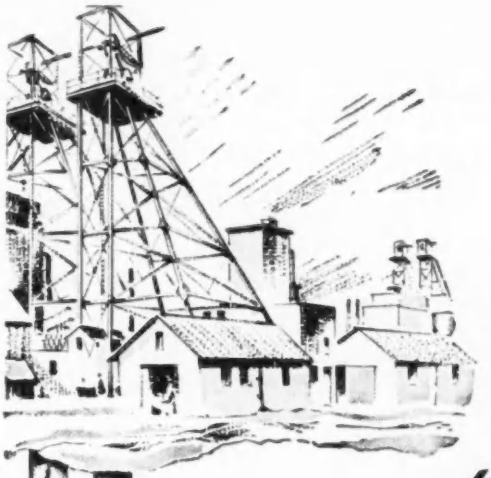

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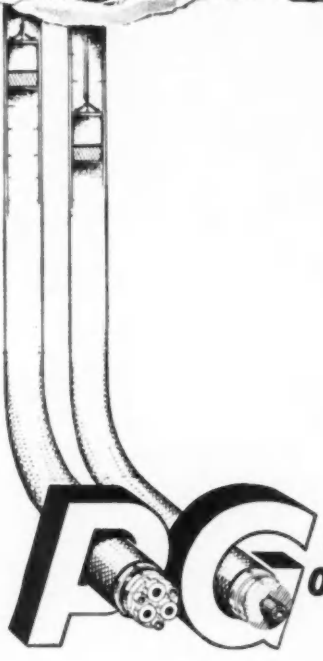

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ELECTRICAL TIMES

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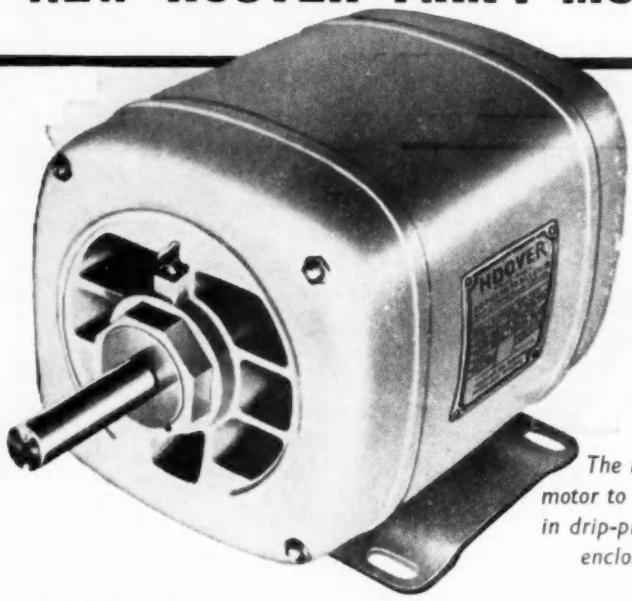

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Editorial

MATERIAL SHORTAGES

THE recent Parliamentary statement by the Ministry of Supply, while causing little surprise to those who have been watching non-ferrous metal supplies, contains little to reassure the industrialist. Zinc seems likely to be restricted to 50% of pre-September consumption instead of 75%, and there will be another 10% cut in copper supplies. Even aluminium, hitherto regarded by many as a relatively "free" material, is affected, supplies of virgin metal being cut by about 12%. The effects of these cuts on normal electrical manufacturing would be serious enough by themselves. Taken in conjunction with an increased rearmament programme, the extent of which is not yet known, they are likely to prove disastrous to any production programme, and it is only too easy to visualise the return of a number of controls and artificial restrictions including attempts at the banning of so-called "non-essential" goods.

"ONE MAN'S POISON"

THIS shortage of metals tempts us to rewrite the old adage as "One man's scrap is another man's raw material." Listening to Mr. Kirk speaking to the South London Group of the Engineering Industries Association, we were more conscious than ever of the part which his organisation, the National Industrial Salvage and Recovery Advisory Council, will play in the hard times ahead. As we learned in our private lives, during wartime and the post-war years, when our regular dealers could not supply our needs, we sought the secondhand merchant. By providing the facilities for a secondhand market, N.I.S.R.A.C. is performing a notable service to the engineering industry, particularly in the case of the smaller firms whose means have not permitted large-scale stocking for the future.

"C.R.C.A."

A POINT which is not universally realised is that the steel situation is even more of a worry to many manufacturers than non-ferrous metals. It is too fatally easy to be complacent about production figures as a whole and overlook the serious situation in sheet and strip. It is even easier to ignore the fact that even "sheets" have many varieties, and that the substitution of one quality for another may cause serious production difficulties. Only those who have tried to build switchgear cubicles, transformer kiosks, control panels, or the like from common black sheets which crack in the bending machine and warp or buckle on assembly, realise the wealth of meaning which lies behind the old purchasing formula, "cold - rolled, close - annealed, hydraulically-stretched."

"THIS PRECIOUS STONE . . ."

EVER since the days of Sturgeon's "uniodirective discharger" and Pixii's first electromagnetic machine, the commutator and its care and maintenance has loomed large in the lives of many electrical engineers. An optimistic forecast made before the turn of the century, that the advent of the induction motor would relegate the commutator to a memory enshrined in a museum seems, to say the least of it, unlikely to be realised. A.C. commutator motors and the recent revival of the d.c. motor with electronic control seem to promise that the commutator will be always with us. Nevertheless, the years have not produced accurate alignment between the varying schools of thought regarding commutator maintenance, and those who use a stone and those who use a diamond lathe tool will for ever wage friendly warfare, not only with each other, but with a third school, the "leave-it-alone"

brigade. Fresh ammunition for the "prostoners" is provided by Mr. Stanley in our leading article this week. No doubt adherents of other schools will not be slow to take up the challenge.

ANCIENT LIGHTS

A SYLVANIA ELECTRIC patent recently published in the U.S. describes the use of zirconium dioxide in the coating of fluorescent lamp cathodes. It is claimed that this contributes to the trebling of the life of fluorescent tubes, which can now be rated at 7,500 hours, instead of the previous figure of 2,500 hours. One's first reaction is to consider whether or not such a life is either necessary or desirable. It is well known that the major drop in lumen output of a fluorescent lamp occurs in the first 100 hours of life, but it should also be remembered that there is a gradual drop in efficiency throughout the whole life. Progressive users, in fact, are beginning to realise that there is an economic life—as opposed to the actual length of time that the tube can be persuaded to strike—just as there is an economic life for a tungsten lamp.

BRUTE FORCE v COAXING

THERE is, however, an entirely different aspect to be considered. Hitherto, the exhaustion of the active material on the cathodes has been the limiting feature of what might be termed the starting life of the lamp. "Bump" starters, as choke-capacitor circuits have been termed, are considerably simpler than either starting switches or the familiar "quick" or "instant" start circuits, which use transformers for cathode pre-heating. They give results which are satisfactory except from the point of view of the lamp itself, which has so much active material removed each time through cold starting that its life is seriously reduced, accelerated life tests killing a lamp in the matter of hours, as against days for conventional circuits. With tougher cathodes, however, it might be possible to employ simplified circuits and still obtain a reasonable life, so that the news now made public may mark a step forward as important as did the development of the halophosphate phosphors about a couple of years ago.

NO MORE FIRES

THE paradox of fires for sale at a time of electricity shortage has been resolved in the South Western area by adopting a policy of actively discouraging the sale and use of electric fires, This may be simple to achieve in service centres under the Board's control but, as Mr. Steward pointed out recently, most of the sales of fires are by private traders and unless they adopt a similar attitude, the Board's initiative may not succeed. It is a little hard on traders to ask them to restrict sales in one field while competing with them in contracting work. Also traders may look askance at this proposal coming after an increase in the Board's hire purchase sales of 1,500%. However, the declaration of policy does remove any ambiguity about the Board's position.

RATING FOR LIFTS

GLANCING through the specification of the new Concert Hall, we were intrigued to see that one of the lifts installed is rated at 2 grand pianos or 60 persons, and that it will be invaluable for transporting orchestra members. In the interests of exactitude we feel that it should be laid down whether the personnel are travelling light or with instruments. While this would be comparatively unimportant in such cases as the piccolo and triangle, with such items as a harp quintette and the two instruments known so expressively to our American cousins as the "bull fiddle" and the "grunting-iron" respectively, the differentiation would be of some moment, so that the figure of piano-equivalence will require a correction factor. It is, however, a notable step forward on the system prevalent in France during the '14-'18 war, when the more familiar method of alternative rating of transport was a notice reading simply . . . *Hommes* . . . 40 . . . *Chevaux* . . . 8.

Meteor

COMMUTATOR MAINTENANCE

Stoning or Turning?—Some Aspects of the Problem

By F. R. Stanley

IT cannot be too often emphasised that if a commutator is running well it should be left alone. On the other hand it cannot be too strongly stressed that should sparking occur due to a flat, the trouble should be dealt with *at once*, before it is necessary to remove from $\frac{1}{16}$th to $\frac{1}{8}$th of an inch of otherwise perfectly good commutator to remove the fault.

Turning

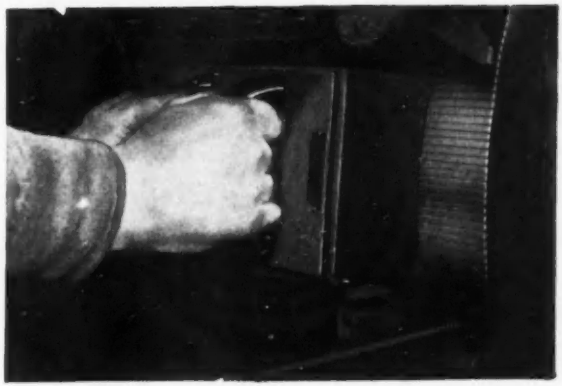
In the past it was the usual practice when a flat occured, to await a suitable opportunity for shutting down the machine, which was then dismantled and the commutator turned between centres or, if a very large machine, mounted for turning in a special set of bearings. The speed at which the armature was revolved during turning was usually far less than the normal running speed which, in certain circumstances, caused disappointing results when the apparently perfect commutator was once again running in the machine.

The reason for these disappointing results is that the commutator is not being turned under conditions which are substantially the same as when running in the machine. For example, the bearings on the machine may not produce running conditions identical with those on the lathe. They may be worn. Again, although the bars should always be checked for tightness and the cone ring and packing attended to if necessary, there is still a possibility that one or two loose bars may be overlooked and thrown out by centrifugal force. The amount they are thrown out during normal running may be quite different from the amount they are thrown out during turning on the lathe. Again, during turning the tool can easily press down a loose bar instead of cutting it, so that when the armature is replaced in the machine and running, the loose bar may rise and soon produce a flat immediately behind it. Turning, particularly diamond turning, is excellent practice and in fact a necessity on new commutators, but in the case of well used machines there is a very real danger that whilst the turned commutator looks nice and shiny it will break down again quite quickly for one or other of the reasons given.

Stoning

About twenty-five years ago, our American cousins in their search for improved methods of commutator maintenance experimented with various methods for cutting commutators *in situ*. Turning tools were tried but soon discarded because of obvious difficulties such as the lack of insulation of metal cutting tools and thus the need to drive the armature by a separate source of power. In the course of time special grinding blocks were developed in which the grinding material was in itself an insulator so that grinding could be carried on with the machine running under its own power. It was found that with a suitable grit and bond, the faster the armature ran the better the grind, so that it was no longer necessary to run the armature at a speed specially to suit the turning tool.

Today, the hand grinding or stoning of commutators is widely employed, although perhaps not so much in this country as in the



The most familiar method. A hand stone in use on a large commutator

United States and some Continental countries. We always were a conservative nation, but even the most conservative maintenance engineer is convinced of the superiority of hand grinding to turning once he has seen the results obtained *by a careful and experienced operator*. It is not really a difficult process, this hand grinding of commutators, but to achieve success every time, it is necessary to follow a few simple rules.

Common Faults

A common fault is to use a narrow stone, probably a new one with a flat end, on a rather wide flat. The initial bearing surface of the stone on the copper is thus a thin line. What happens when the armature is run? Of course the stone bumps and instead of grinding off the high copper it probably deepens the flat itself, resulting finally in a thoroughly eccentric commutator. The correct procedure is to select a stone which is at least one and a half times and preferably twice the width of the flat so that when applied to the commutator it will be guided by the undamaged portion of the commutator and cut the copper evenly.

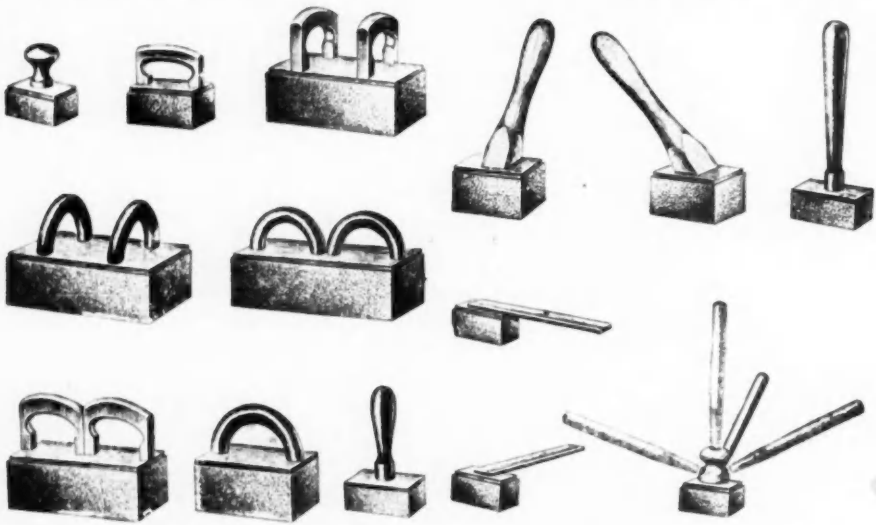
Another fault is to use too wide a stone, often almost the width of the commutator itself, and to hold it there in one position until the required amount of copper has been removed. The effect of this treatment is to form circumferential grooves in the commutator which reduce the maximum brush contact area. The correct procedure is to choose a stone which is wider than the flat but narrow enough to be moved from side to side—traversed—during grinding.

Eccentricity

It is sometimes said that "Commstones" are all right for removing a small flat but no good for dealing with eccentric commutators. Apart from the fact that the prompt use of stones prevents eccentricity, it is far too sweeping a statement to make. Eccentricity can be corrected by stones in two different ways according to whether the eccentricity extends almost to the two ends of the commutator, as might be the case with very wide brush tracks, or whether a fair proportion of the surface of the commutator is still concentric.

If the former is the case and the commutator is generally out of round and in a bad state, it is generally necessary to use a form of slide rest into the saddle of which one or two stones of coarse grade are securely mounted. Gentle feeding-in and regular traversing of the stones across the face of the commutator will ensure final concentricity. The surface can be polished either by hand stone or by employing a finishing stone in the slide rest.

Where the eccentricity does not cover the whole width of the commutator, a slide rest is not required. It is only necessary to select a

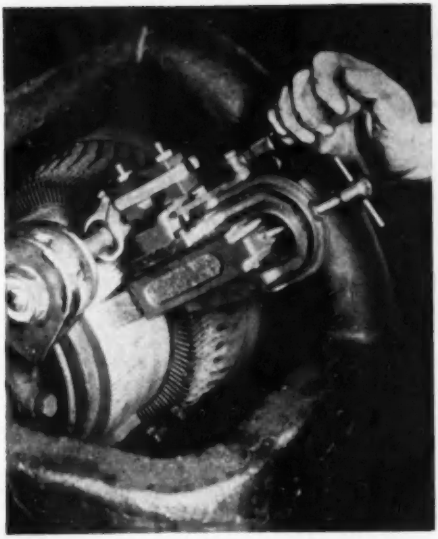


A few of the various types of stone made. Other types (not shown) include small stones for f.h.p. motors and toolholder type for use with slide-rest units

hand stone which is wide enough to cover the eccentric area about twice over and preferably (but not necessarily) narrow enough to be moved from side to side during grinding. If the stone cannot be traversed or moved sideways during grinding, although the eccentricity will still be removed, circumferential grooves will in all probability be formed. These can be ground out by using a narrower hand stone and traversing it the whole time.

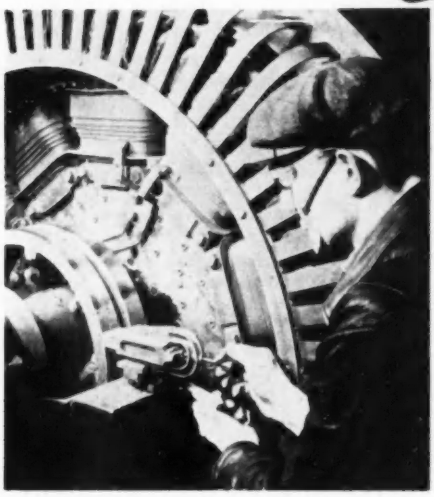
The proper traversing of the stone during grinding is an essential part of the process and at the same time the operator should learn to apply an even pressure on the stone so that not only is the finished commutator perfectly concentric but also cylindrical without taper. Should a careless operator produce a slight taper, it can be corrected by careful application of the hand stone, although the use of the slide rest will facilitate the correction.

"Commstones" are made in a number of different grades of grit, but in practice two grades are sufficient; a coarse stone where it is necessary to remove a large quantity of copper, and a fine or finishing stone where only high mica or a small amount of copper has to be removed. They are made in a very wide variety of shapes and sizes and are usually attached to handles to suit the particular application. Small stones may have knob handles, saw handles, railway handles, right-angle handles or combination handles, while larger stones may have tramway handles, flat-iron handles or double flat-iron handles. The working surface is flat when supplied, but owing to the characteristics of the binding agent the appropriate curvature for the commutator being treated is speedily formed.



Using a slide-rest unit mounted on a brush rocker arm

Typical slide-rest unit with lathe-type stones



Truing slip rings with a slide-rest unit on the machine frame

Importance of Grade

One of the important features of a good stone is the correct grade of grit and a suitable bonding agent for the grit to ensure rapid grinding, clean cutting of each bar without "drag" and at the same time freedom from clogging. The stone must be made up of thousands of fine cutting points with pores large enough to receive copper chips without clogging up the stone. The bond must be of a type which will melt as soon as heat is generated by the friction of dulled particles so that they may be released, and it must occur before the particles have become dull enough to drag or pull the copper instead of cutting cleanly.

Many of the particles, after they are released from the stone, lodge momentarily in the pores of the stone and continue to cut copper as long as the edge or point of the particle remains sharp. The rolling action of these particles also keeps the surface of the stone free from any collection of copper. A good commutator stone must wear rapidly and evenly, so that this breaking down process continues all the time. Only in this way will dragging of copper at the edges of the commutator bars be prevented and uneven grinding, producing circumferential grooves, be avoided. Probably in no other form of grinding is the selection of a good stone so important.

Hints For Using Commutator Stones

If grease or oil is present, wipe or sandpaper the commutator thoroughly before applying the stone, because oil will interfere with the cutting and often cause the stone to clog with copper.

Run the machine at full speed.

Do not rock the stone; hold it firmly in order to get a true arc as quickly as possible.

Apply with sufficient pressure to get rapid cutting. From two to four pounds per square inch of cross-section will usually give good results. If the stone wears faster on one side than on the other, it is because the pressure is not applied perpendicularly. The effect may be corrected by turning the stone three or four times until the full face has been obtained.

During grinding, move the stone slowly from side to side. This will prevent ridges in the commutator from wearing grooves in the stone. Large stones which are difficult to move while grinding may be held in one place for a few seconds, then lifted, moved about ¼ in., applied again for a few seconds, moved again, and so on until the commutator is true. Another and better way is to remove one or more sets of brush boxes from the brush arms and then to use a brush arm as a rest for the stone which makes it easier to oscillate the stone from side to side during grinding.

Undercutting

After the commutator has been ground, it will of course be necessary in most cases to undercut the micas, and for the purpose there are a number of specially shaped files on the market, although for large commutators and for accurate work it is better to employ a machine specially designed to do the work. There are machines available for small commutators up to about 4 in. diameter, in which the armature is removed from the motor, and larger undercutters both electric and pneumatic in which the micas are undercut with the

Undercutter using saws or cutters, driven by flexible shaft from an electric motor

armatures *in situ*. Another machine embodies a file which is reciprocated by an electric motor, while another machine employs very small cutters or saws, which can produce U-type or V-type slots, according to the type of wheel or cutter fitted. Such machines are operated either electrically or pneumatically, and in the case of the latter type the exhaust is used for conveniently blowing away the copper chips.

Blowing

When the final grinding and undercutting has been performed, it is then necessary to remove mica dust and copper chips from the motor or generator. This would ideally be done by a suitable suction device, but in practice it has been found best to start by blowing out the dust, except in the cases of very open machines, when a suction cleaner can be used. Portable electric hand blowers are available which can be used either for blowing out or for suction cleaning.

During the operations of grinding and blowing out the dust, it is advisable for the operator to wear a light dust mask, particularly if he is doing very much of this type of work. It ensures freedom from throat irritations which may result in infection.

There is no need to stress the importance of good commutator maintenance. The job is often neglected due to the trouble involved and frequently the need for shutting down. Commutator stones can supply the answer to these problems. They cut every bar clean without dragging of copper. They remove ridges, flats, high bars, high mica, quickly and more effectively than any other method, and they save from 80% to 99% of the time required to remove an armature and turn the commutator in a lathe.

Acknowledgement is made to the Martindale Electric Co. Ltd. for the use of illustrations in this article.

The B.E.A. Report

—*An Editorial Commentary*

ON first studying the second B.E.A. report we were somewhat startled to find that certain of the comparative figures given for the year 1948-49 did not agree with those in the first report. Closer reading disclosed a short note in small type stating that this was due to the "co-ordinating and unifying of accountancy practice." After some effort at pursuing elusive figures we had to give up, and turn to the Area Board reports, in some of which we found a brief explanation of what has been done.

These changes are by no means minor adjustments but are often major variations in figures and, as some of them are related to that delicate sphere—contracting and trading, members of the industry have a right to expect the courtesy of a proper explanation. We do not question the validity of the figures, nor the B.E.A.'s right to make such changes, but it is not enough that figures presented by a public corporation should be accurate, they should be patently so. To make confusion worse, the above-mentioned note states that the adjustments have been made by *some* Boards without indicating whether the figures which show no adjustment are determined by the new or the old method of accounting. Consequently there is uncertainty whether some sets of figures which are *prima facie* comparable, have in fact any relation to each other.

We are pleased to see that our plea for the inclusion of an index has been met and that greater detail has been provided in the engineering sections. No longer is transmission treated in a cavalier manner and there has been some useful tidying up in other spheres. For certain information, unfortunately, such as the breakdown of classes of area board consumer, the reader has no alternative but to refer to the fourteen area reports and produce his own tabular summary.

Clow Excuses

In our review of the first year's report we commented on a certain lack of objectivity in the style of presentation. Unfortunately, the second report has something of the same air of self-righteousness. A particularly bad example of this is found in the section on the Clow surcharge.

> Exceptionally fine and warm weather prevailed throughout the summer and autumn of 1949. In consequence of this and other factors which adversely affected electricity consumption, the units consumed by domestic consumers qualifying for rebate did not reach the totals anticipated, and, as a result, Area Boards were left with balances in respect of the surcharge totalling £1·6 million.

While the weather may have affected the issue to some extent, it was abundantly clear from the time the surcharge was first made that a substantial balance would result from attempting to equate the sum of units sold in three summer quarters with 3½ times those in a winter quarter. The above paragraph sounds like a valiant attempt to whitewash this unfortunate episode.

The net surplus of £7 million from the second year's trading is an increase on the former year, but is still no more than 1·6% on the issued stock, which is by no means an excessive return. The principal increased expenditure, apart from that due to greater output, has gone in salaries and wages, particularly in administration, where a full year's charge on much of the expenditure has had to be borne for the first time. This applies particularly to the northern areas which were somewhat slower in building up their organisations. On the credit side is a substantial economy due to improved efficiency, £1·5 million saving on fuel cost and £3·5 million due to increased charges on two-part tariffs. This year is the first to show the full effect of the increase of the domestic running charge to ¾d., and in consequence the yields from the different classes of tariff appear to be better balanced.

Capital Cuts

The report, although outspoken on the effect of the Government limitations on capital expenditure, is less so than Lord Citrine's widely quoted statement that the situation "is not only serious but may be dangerous or even disastrous." For generating capacity this limitation is not so serious, since the capital allocation appears to be geared to the present rate of plant production. Former Economic Surveys have been over generous in their estimates, which is shown by the back log on former programmes amounting to 1,298 MW

at the end of 1949. The whole position is set out with admirable clarity in a new table on page 20 of the report. It is transmission and distribution where the capital limitation shoe pinches. This is particularly unfortunate since the B.E.A. is planning increased use of transmission, including the development of the 275 kV grid. In the future, power station sites will be chosen with less regard to load centres and more consideration for other factors. This will probably mean that programmes after 1954 will reflect a greater accretion of generating power in areas within easy reach of coal.

Districts are Important

In the early years of the B.E.A. when the top level organisation was the main concern, electricity districts often received scant attention, yet they are the basic foundation of the industry's commerce, as we pointed out at the time. In consequence it is encouraging to see in certain area boards reports, reference to the part that districts have to play, and to the greater authority being delegated to them. But if districts are to be given their rightful place, then their individual trading results should be worthy of inclusion in area reports. Such a step would not only provide an element of competition which is much needed, but the linking of local staffs with the published report should have a beneficial psychological effect.

It is perhaps curious that the boards which make the above comment are almost all in the south, and the characteristic of the south is a high domestic load. Is there, we would ask, any relationship between the degree of delegation of authority and the nature of the load? Certainly where industry is a predominating feature, specialist advisory services are necessary to a standard which could not be economically maintained below sub-area level.

Turning next to the accounts for contracting and sale of fittings, the outstanding feature is the sharp increase in hire purchase sales from £1·6 million to £5·1 million. In this, the performance of the South Western and Eastern Boards is particularly notable, on the other hand the surplus of the South Western Board of 0·8% total sales was the lowest of all areas. The surpluses are given in the accompanying table, but this year we are not reproducing the administration cost. The 1948-49 figures have been considerably amended since the first report, and substantial sums have been transferred from direct to indirect costs in respect of transport, and from administration to salaries and wages.

RELATIVE RESULTS AND PERFORMANCES OF AREA BOARDS

	Population /sq. mile	1 Domestic units/ head	Industrial units/ indus. consmr '000	2 Distribution d./kWh	3 Administration d./kWh	Revenue d./kWh: 4 Domestic	Power	5 Total	6 Surplus on sales and contracting-%
London	**20,400**	**378**	**28·0**	**0·208**	**0·200**	**1·78**	**1·39**	**1·63**	**3·4**
	20,200	359	29·6	0·206	0·196	1·77	1·38	1·61	6·3
S.E.	**1,030**	**403**	**61·2**	**0·175**	**0·171**	**1·61**	**1·15**	**1·48**	**1·2**
	1,025	400	66.2	0·172	0·162	1·59	1·11	1·47	6·4
S.	**571**	**332**	**82·9**	**0·156**	**0·162**	**1·69**	**1·24**	**1·52**	**3·3**
	570	323	81·1	0·140	0·165	1·60	1·25	1·47	6·5
S.W.	**379**	**364**	**60·9**	**0·147**	**0·191**	**1·55**	**1·12**	**1·42**	**0·8**
	376	361	55·2	0·158	0·169	1·48	1·12	1·38	7·6
E.	**604**	**390**	**86**	**0·133**	**0·168**	**1·55**	**1·06**	**1·35**	**3·4**
	603	378	84·5	0·124	0·158	1·46	1·08	1·31	3·6
E.M.	**582**	**348**	**97·3**	**0·107**	**0·091**	**1·41**	**0·93**	**1·15**	**6·8**
	578	327	91·5	0·109	0·075	1·34	0·98	1·14	4·9
M.	**800**	**393**	**121**	**0·091**	**0·097**	**1·41**	**0·88**	**1·09**	**2·9**
	800	381	113	0·096	0·088	1·32	0·89	1·07	7·8
S. Wales	**435**	**263**	**506**	**0·092**	**0·094**	**1·59**	**0·73**	**0·94**	**4·3**
	431	235	520	0·077	0·086	1·55	0·73	0·91	1·9
M. & N. Wales	**599**	**329**	**219**	**0·121**	**0·089**	**1·47**	**0·84**	**1·09**	**1·1**
	595	306	202	0·110	0·078	1·42	0·86	1·08	0·8
Yorks	**1,016**	**386**	**166**	**0·082**	**0·078**	**1·38**	**0·78**	**1·01**	**6·1**
	1,010	341	156	0·088	0·069	1·28	0·80	0·98	7·0
N.E.	**525**	**241**	**345**	**0·095**	**0·094**	**1·55**	**0·79**	**1·02**	**10·7**
	522	224	348	0·094	0·080	1·47	0·79	1·00	10·1
N.W.	**962**	**414**	**134**	**0·102**	**0·099**	**1·41**	**0·89**	**1·12**	**4·2**
	963	406	134	0·102	0·082	1·33	0·89	1·09	4·9
S.E. Scot.	**425**	**278**	**128**	**0·093**	**0·091**	**1·45**	**1·00**	**1·23**	**7·4**
	421	278	116	0·084	0·098	1·37	0·98	1·19	1·9
S.W. Scot.	**518**	**299**	**347**	**0·092**	**0·069**	**1·16**	**0·95**	**1·05**	**7·4**
	515	304	362	0·080	0·060	1·08	0·94	1·00	17·1
B.E.A. Total	**708**	**355**	—	**0·120**	**0·118**	**1·52**	**0·93**	**1·21**	**3·9**
	704	342	—	0·117	0·112	1·45	0·93	1·18	5·7

Bold figures refer to year 1949/50, light figures to 1948/9. (1) Including farms; (2) Operation, repairs and maintenance; (3) Including general expenses; (4) Including commercial and farms; (5) Excluding inter-area sales; (6) Percentage on total sales

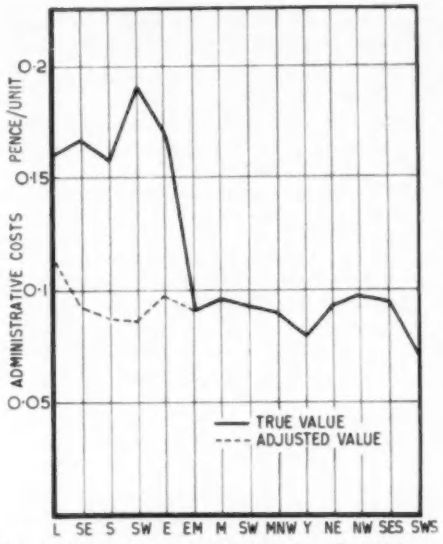


Fig. 1. Administrative costs/unit sold. Dotted line adjustment mentioned in text

We must, however, express disappointment that the overall surplus has fallen by £130,717, despite an increase in sales by £4½ million.

Severn-Wash Line

In our review of the first report we drew attention to the sharp division in costs and revenue per unit which exists between Boards north and south of a line drawn between the Eastern and East Midlands Board, or expressed geographically between the Severn and the Wash. This aroused considerable interest, and we feel it worth while to study more closely this factor which is found to recur so frequently throughout B.E.A. figures.

The division in cost on the Severn-Wash line is clearly shown in Fig. 1, where the solid line represents administrative cost per unit plotted against Area Board. (To mathematical purists we apologise for presenting block figures as a curve; it facilitates comparison and, more important, saves space.) The general shape of the curve, however, applies equally to other costs, and in seeking a reason for this sharp differentiation, the major factor of salaries and wages suggested an examination of the proportion of employees on Boards north and south of the line.

Fig. 2 shows the number of units sold per manual worker and for technical, administrative and clerical staff in the two years. Here again, the characteristic feature of the Severn-Wash line is seen, with performance considerably better in the north. In the first year's report, separate figures were given for technical staff and administrative and clerical staff, and these showed that the variation between north and south was considerably greater for administration and clerical than for technical staff.

To attempt an assessment of how far the proportion of employees accounts for the higher costs south of the Severn-Wash line, we have drawn the dotted line in Fig. 1. This is determined by adjusting administrative costs of southern boards on the premise that the units sold per employee was the average figure for all Boards north of the Severn-Wash line. The pronounced levelling effect obtained suggests that it is the units sold per employee that is the main if not the whole explanation.

It is well known that in the south the ratio of domestic units sold is higher than in the industrial north, and in Fig. 3 we show the

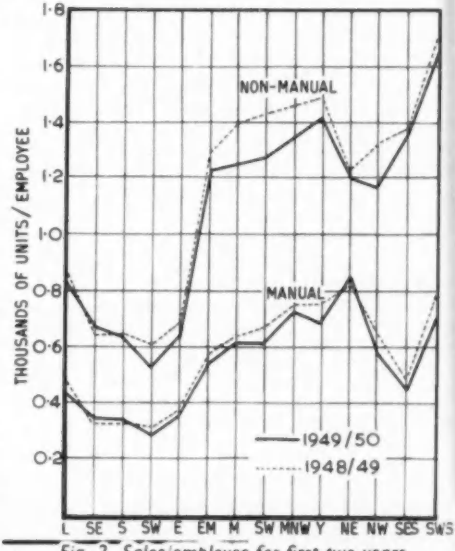


Fig. 2. Sales/employee for first two years

percentage of non-industrial units sold to total units. Against this we have set the two years curves of area costs per unit, excluding purchase of electricity, and interest. It will be seen that, broadly speaking, the curves follow similar trends, and clearly suggest that it is the higher distribution and administration cost per domestic unit that principally accounts for the Severn-Wash characteristic. A further study of

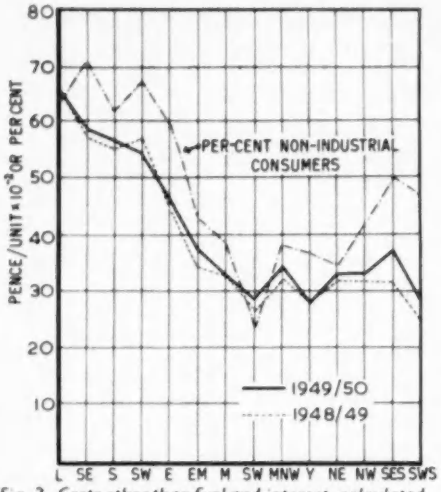


Fig. 3. Costs other than fuel and interest, calculated on a unit basis

the figures shows that there is a closer relationship of total distribution and administration cost per unit with non-industrial units alone than with total units sold. A better corelation than this is not possible because of the idiosyncrasies of the individual areas. In this, one of the important variables is the industrial units per industrial consumer. The wide range from South Wales with 506,000 units to London with only 28,000 is shown in Column 3 of the accompanying table.

Finally, considering the above figures, we have excluded the bulk cost per unit paid by the Area Board for electricity, and this also is higher in the south, because of the high coal cost adjustment charge, thus widening the difference in overall cost per unit between the north and south. Since this bulk cost forms the major item in the overall price per unit sold, and, excluding load factor, is common to all classes of consumer, the effect of the higher distribution and administration cost per non-industrial unit on revenue per unit will be partially swamped. Nevertheless, when all factors are considered, it is not easy to escape the conclusion that the revenue per domestic unit is low compared on a cost basis with other classes of units sold.

In this article we have attempted to indicate some of the directions in which we feel improvement could be made, but this should not be interpreted as any criticism of the report as a whole. We have previously mentioned our appreciation of the form of accounts and the detailed information provided which enables the performance of the supply industry to be analysed to an extent not possible before.

Diesel Locomotive Production

THE extensive use of electric welding for fabrication of diesel-electric locomotives in the United States was one of the points emphasised by the Diesel Locomotive Industry Productivity Team which has now issued its report on American practice. This report is available (price 3s.) from the Anglo-American Council on Productivity, 21 Tothill Street, London, S.W.1.

The principal recommendations of the team—many of which are applicable to other industries besides the one under investigation—are that design staff should aim at the principles of unit construction, that management-worker relations in America were more advanced than in Great Britain, that consideration should be given to the abolition of piecework and the substitution of an enhanced hourly rate, with time study, in order to establish agreed standard time, and that the application of correct programming and design could reduce the number of skilled workers required, without reduction in the quality of design.

The team was particularly impressed with the engineering originality shown by the design staff, and by the planning which ensured the availability "all along the line" of the correct material in the right quantity at the proper time. This eliminated the frustration felt by employees who were being continually held up for some item or other, the production of which was out of their control.

Cutting and Welding

Pre-machining of plates in preparation for welding is reduced to a minimum, flame-cutting for preparation being the invariable practice. It is generally admitted that the welder is "No. 1 Employee" in diesel locomotive construction and high rates are paid to this class of labour. There are, incidentally, no restrictions on the amount of fitting or assembly that may be done by the welder when he is tackling a job.

With heavy-duty welding machines $\frac{5}{16}$ in. and $\frac{3}{8}$ in. diameter electrodes are in common use as single runs are preferred. Extensive use is made of manipulators of all sizes to obtain the maximum amount of down-hand welding.

The report also contains sections on Market Research and Sales Organisation, Production Design and Organisation, Costing and Accounting, and Labour Relationships.

Cooling Tower Improvements

B.E.A. Research Eliminates Carry-over

THE nuisance caused by water droplets falling to the ground in the vicinity of large cooling towers has long been a cause of numerous complaints from the general public. In consequence, the B.E.A. initiated a programme of research into this subject which has now been brought to a fruitful conclusion.

Line of Attack

It was obvious from the start that any solution had to be readily applicable to existing towers, economical in cost, and effective in operation. For the first two reasons the conversion of towers to the "film-flow" system (an article on this subject was given in the ELECTRICAL TIMES of August 31) was ruled out, although an experimental installation, using film-flow has been applied to one of the towers at Darlington.

A study of past literature showed that comparatively little practical work had been done on the subject, and also disclosed that two schools of thought existed; the first held that the precipitation was caused by condensation of the water in the warm air passing up the tower, when it came into contact with the cooler exterior air, and the second considered that the real cause of the trouble was that droplets of water from the sprays were being entrained in the up-draught and carried over for deposition outside the tower. Preliminary investigations showed that this second view was the correct one. The problem thus boiled down to preventing these droplets from leaving the tower, and devising a means for so doing which would not impair the efficiency of the draught and heat transference functions of the installation.

Experimental Equipment

The first requirement was to build an experimental representation of a section of a tower in which all essential parameters could be measured and by using this to try out the efficiency of various types of baffle or eliminators, introduced above the space within the tower, above the sprays. A sectional view of the experimental tower is given in the illustration.

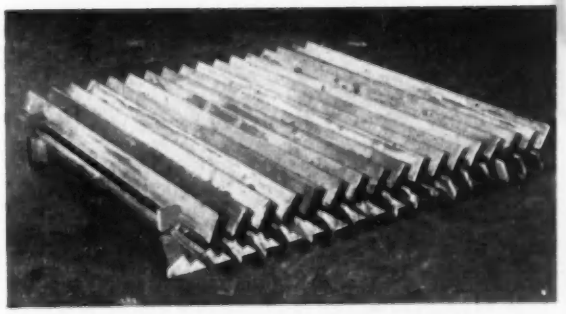
Air is circulated round a closed circuit by a motor-driven centrifugal pump. Near the top of the tower, water is introduced by two downward pointing nozzles discharging into splash cups which ensure a finely divided spray. The eliminator under test is inserted into the tower above the nozzles, and a micro-manometer capable of reading pressure differences of the order of 0·002 in. of water is connected across the eliminator. The quantity of water being carried over is checked by timing the quantity collected by a Calder-Fox Scrubber introduced in the air circuit. To prevent misleading readings due to the air not being saturated, the circulating motor is run for some time before readings are taken, to avoid condensation problems, the tower is heavily lagged.

As air flow, and water flow can be controlled, it is fairly easy to simulate conditions similar to that of a large tower.

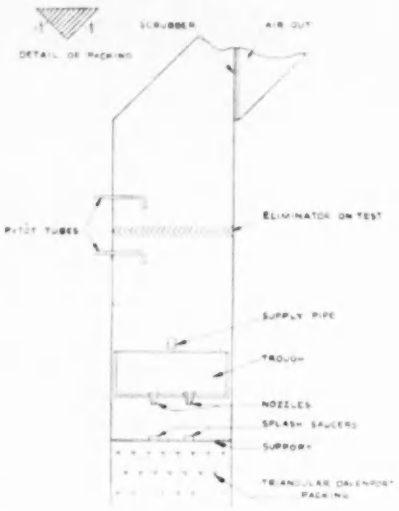
Test Findings

The apparatus was completed in April of this year, and in the following four months over fifty different schemes were tested under strictly comparable conditions.

From the results of these tests, a simple arrangement was devised which removes practically all of the water droplets, whilst presenting little obstruction to the airstream. Special care was taken to reduce the amount of timber required to the minimum which is compatible with a satisfactory working life in the exacting conditions in a cooling tower. A device, termed a "louvre type eliminator," is fitted horizontally across the tower some 10 ft



The finalised louvre eliminator arrangement



This sketch shows the arrangement of equipment at the nozzle level in the experimental cooling tower

above the level at which the water is introduced. It traps the water droplets very soon after they have been picked up.

The cost of this modification is under one quarter of that for the scheme installed at Darlington, and it allows even less water to escape from the tower. A programme has been prepared for modifying all cooling towers operated by the British Electricity Authority which have been a source of complaint. It will be put into effect during 1951. All new towers constructed in built-up areas will be fitted with eliminators in the course of construction, so that they will never give rise to a nuisance.

Further research will now be conducted with a view to reducing the size and cost of cooling towers and also to finding more durable materials for use inside the towers,.

The Harwell "Gleep"

Details released of Britain's graphite low energy experimental pile

INFORMATION dealing with the construction and operation of "Gleep," the slow neutron reactor at Harwell, has now been released by the Ministry of Supply. This pile uses graphite as a moderator and natural uranium and uranium dioxide as fissile material. It was constructed to meet two main requirements: (*a*) to run at as high a power as possible without elaborate cooling arrangements, and (*b*) to compare slow neutron absorption cross-sections of the elements by the pile modulator methods. "Gleep" can provide a reproducible thermal neutron flux in the range 10^6 to 10^8 neutrons sq cm sec.

General Description

The line drawing shows the general arrangement of the pile. A cylindrical reacting core, 5·24 metres long by 5·72 metres diameter is contained within a right octagonal prism of graphite lying on one of its sides. The total quantity of graphite in the pile is 505 long tons and it is in the form of blocks stacked in such a manner that a lattice of diamond-shaped holes of 1·85 in. side runs through the pile from the "A" to "C" face. The uranium metal, in the form of cylindrical bars 12 in. long by 0·9 in. dia, is sprayed with aluminium 0·003 in. thick to prevent the escape of recoil fission products and the uranium dioxide is contained in pellet form in cartridges 12 in. long by 1·62 in. dia. In all 92 tons of uranium and 21 tons of uranium dioxide are used. A 5 ft thick concrete shield surrounds the pile, the roof being 4 ft thick, and a 3 ft air space is left between the graphite and the concrete. An elementary air ventilation system gives a certain amount of cooling, and using this, the pile can be run at 100 kW.

Control is exercised by four cadmium rods (coarse control) and a single rod (fine control), these rods are actuated by electric motors. Emergency gravity operated rods are also provided to "shut down" the pile in emergency. Magslip transmitters indicate the position of the rods to ± 1 mm. The power level of the pile is measured by means of six ionisation chambers of 5 litres volume, containing boron trifluoride gas at a pressure of 20·7 cm Hg. Three of these are used for pile control and three are used to operate the shut-down mechanism. Pre-amplifiers are located at the chambers, the main amplifiers being in the control room, and, by means of a switch the sensitivity of the pre-amplifier may be changed to a new level. By moving the chambers out of

the pile to two other preset positions the sensitivity may also be varied, and the chambers can thus measure six decades of pile power.

Pile Operation

The "Gleep" has seven experimental holes running between faces, which are used for various purposes, depending on the experiments being carried out. One has been used for the preparation of radio-active isotopes, one for pile oscillator work, and one for checking the effect on the reproduction constant of the pile of inserting large quantities of material (the reproduction constant "k" being defined as the ratio of the number of neutrons in one generation divided by the number in the preceding generation).

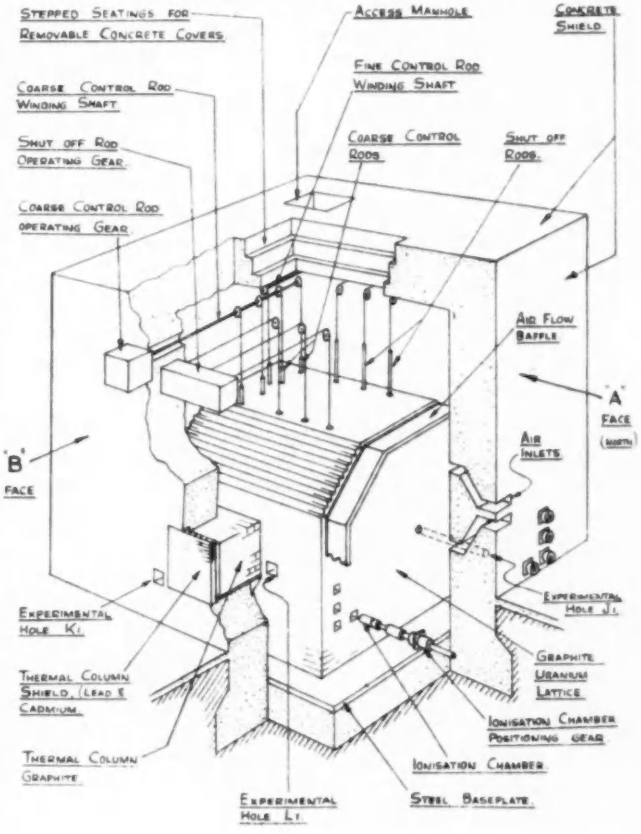
Shortly after the pile started operating a run was made at 100 kW without the cooling air in operation. It was found that as the temperature of the pile rose, the control rods had to be withdrawn to keep the power at 100 kW. From the rod libcaration and measurement of the temperature rise, a temperature coefficient was derived. In terms of the effective reproduction constant this was $-2{\cdot}9 \times 10^{-5}$/°C. Now as the excess effective reproduction constant ("k"-1) of "Gleep" is only 2×10^{-3}, this means that the negative temperature coefficient would prevent the pile reaching more than 70° C even if the control system failed.

Atmospheric pressure has also an effect on the pile operation as it alters the amount of nitrogen which in turn affects the reactivity. The change in effective reproduction constant due to this cause is $-6{\cdot}5 \times 10^{-6}$/millibar.

Measurements of radio-activity taken at the air outlet showed that the uranium dioxide cartridges were giving off gaseous fission products, this was prevented by blocking off the sections concerned from the air stream.

Experiments are being carried out on an analysis of the pile's behaviour to the introduction of various samples of material.

These experiments consist of moving the sample under investigation in and out of the pile along one of the holes. Samples are housed in a graphite container and driven from outside of the pile shield to the inside of the pile by means of an electromechanical system. The samples are moved between these two positions in a regular manner so as to produce a periodic modulation of the pile power (the samples remain in each position for 30 sec and take 3 sec to move from one position to another). The varying voltage output from the ionisation chamber amplifier is multiplied separately by sine and cosine factors derived from the sample movement (which is of the simple harmonic motion type) and is then fed into two velodyne integrators and integrated for one period. This enables the change in "k" to be calculated.



Notes on Wiring
by MEGOHM

Unorthodox Wiring Work

The menace of spare-time and amateur wiring

BY a curious coincidence as I was reading the report of the paper by my old friend Mr. A. J. Dalton of the S. Wales Electricity Board, and the editorial comments in last week's *Electrical Times* concerning the multitudinous and nefarious activities of skilled and unskilled spare-time wiremen, my thoughts were repeatedly distracted by a fellow passenger in the railway compartment who was dealing with the same subject from the opposite angle.

So far as I could gather from the conversation forced upon my unwilling ears, two neighbours, neither of whom possessed much electrical knowledge, had come to the conclusion that wiring contractors in general were swindlers of the worst type; and as there was next to nothing in the job, any practical person might as well do it himself and thus save quite a lot of hard cash.

High Costs

The fundamental trouble as I see it is the question of £ s. d. For the last thirty years or so the various interested parties have done all in their power to promote the use of electricity. Today there is no apparent shortage of electrical appliances and labour-saving devices; people are "electrically minded"; and alluring advertisements appear in most publications. Unfortunately the wiring in most private dwellings lags far behind modern requirements, particularly in those built before the war.

In the result the consumer usually is faced with the problem of rewiring or permanently extending his wiring installation, or alternatively extending it by the use of adaptors and temporary wiring by means of flexibles. The latter method is obviously a very poor substitute from any point of view, but unfortunately has the merit that it works and is the cheapest solution available.

Before the war it was possible to obtain a firm's quotation for wiring work no matter how small the requirements might be, but today with the rapid changes in prices, practically always in the upward direction, most firms insist upon a cost variation clause and this must always have a detrimental effect upon business.

Labour costs have increased considerably, and I fear the output per man-hour has decreased at the same time, which again is reflective in manufacturing costs, and, to complete the tale of woe, we have the abomination of purchase tax. As examples of present day costs a bakelite push-bar holder of unknown make bought over the counter costs 4s., a ditto 2 amp switch-socket double, and twin flex 1s 9d. per yd. The net result is that the overall cost of any type of wiring has increased by several hundred per cent. whereas the incomes of the middle and lower-middle class prospective customers have not advanced in the same ratio—far from it in fact.

If the above premises are correct and we furthermore agree that a temporary or badly wired installation will function for a time, no matter how dangerous or unsuitable it may be, then we must admit that the temptation is there to postpone the spending of hard earned cash as long as one possibly can.

The Lesser of Two Evils

As Mr. Dalton pointed out in his paper, the present position encourages two forms of retrogression; the spare time wireman, who carries out freelance work at cut prices without much regard for the ethics of his calling; and the pure amateur, with a smattering of knowledge, who does his own work for reasons of economy. Of the two the former is the least objectionable, but it is difficult to see how both may be entirely eliminated in a free society such as ours.

The extent of the activities of the pure amateur can be judged with some accuracy by a visit to any multiple store or cycle-radio and electrical shop selling electrical goods over the counter. Strange requests, for information, and dangerous advice tendered can often be heard there.

Considering all things then the solution seems to be to reduce our costs for wiring work and extend the system of deferred payment at reasonable rates of interest.

An Engineer Electrifies his Farm

Battery installation basis of efficient working

PROBABLY the nearest approach yet to the long-cherished ideal of an all-electric arable and stock farm is to be found in a 60-acre holding at Lechlade Mill, Gloucestershire. Generating all his own electricity, the owner, Mr. Rene Tondeur, not only lives in an all-electric house, but also employs electrically powered tractors and trailers.

A consulting engineer by profession, he came to this country from Belgium many years ago, and started to look for a farm. In 1939, he came across Lechlade Mill, which was then derelict, purchased it, and proceeded with the conversions which have brought the farm up to its present-day pitch of efficiency.

He installed all the electric plant himself, utilising water power from the River Leach to drive two turbine-generators from which current is supplied to the mains circuit and a battery. The battery, which comprises 95 cells of 240 Ah, connected for 210-220 volts, floats across the mains. A double-pole switch fitted between each generator and the battery allows him to work on either or both generators, according to the depth of water at the time.

The current is used for running subsidiary motors, a circular saw, for electric welding and for driving workshop tools, as well as for lighting, cooking and heating in the farmhouse. The only emergency provision made is to have a fire for water heating in the event of the river level falling too low to operate either turbine.

Diesel-Electric Tractor

The most notable advances, however, have been made on the purely agricultural side. Here a four-wheel drive and steering diesel-electric tractor has been so designed that it can be propelled by diesel alone, diesel-electric—the engine driving a dynamo, which in turn, drives a motor—or by a battery. The battery, 36 V and of 129 Ah capacity, also supplies current for starting the engine, for the field of the dynamo and motor, and for lighting during work at night. The dynamo generates direct current at 230 volts, and can be connected, when desired, directly to the farm lighting and power circuit, through a three-pin plug and socket. For nightwork, a 500 watt lamp with two subsidiary 36 watt lamps is used, as well as a further 36 watt lamp in the rear.

The same battery also powers the electric lifting tackle fitted to the tractor for raising or lowering plough, drag harrow or other implement. Mr. Tondeur believes that this electric crane-lift has many advantages over the ordinary hydraulic equipment as it can be used as a plain winch when required.

Battery operated welding tools, using rods up to 3/16 in. diameter, are also carried on the tractor for on-site repairs to implements and so on. The largest electrode (6 gauge) takes about 250 amps. from the battery at an effective voltage of 25. In spite of this very heavy discharge, Mr. Tondeur is sure that the battery suffers no harm as a result.

Further Electrics

In addition to the diesel-electric tractor, an American Dodge Command car is used, which has been adapted to perform similar duties. A lifting-winch fitted on this vehicle is operated by the engine.

Mr. Tondeur's diesel-electric battery tractor

This is the converted Command car with electric hoist

The car's rear axle assembly proved too light to withstand the strain imposed by the heavy load of the plough—a two-furrow type, set to a width of 12 in. and a depth of 7 in.—and, therefore, it had to be considerably strengthened. A triangular frame with an electric motor was also built on the front to act as a forward implement lift.

The battery fitted on the Command car is of 12 V, 120 Ah capacity, and when the cable-operated trailer ditch-digging attachment is used with the car, power can also be drawn from this source for such auxiliary operations as emptying the ditching bucket.

Welding

Another useful accessory is a wheeled truck carrying a battery and welding equipment. Eighteen alkaline cells are mounted on the truck, which has four steel corner pillars on which is fixed a steel table about 9 in. above the battery. The welding arrangement comprises a voltmeter, ammeter and switches, together with a series of resistance tappings marked for the different sizes of welding electrodes, 6, 8, 10, 12 and 14 gauge. The welding tool is clipped on to the appropriate tapping for the electrode to be used.

The largest electrode (6 gauge) takes about 250 amperes, and the 10 gauge, which is that most used for general purposes, takes 95-130 amperes.

Mr. Tondeur is enthusiastic about the use of battery current for welding purposes, by comparison with a.c. current and dynamo d.c. current welders. The efficiency of the method is high compared with that of the rotary or transformer types, particularly as there is no fuel or current consumed until the actual weld is taking place. The voltage is very much more constant, and there is very little spluttering.

The plant necessary for recharging the battery is much smaller than that required for the other types of welder.

Any type of welding job can be tackled, such as welding spring steel to repair plough shares, and Mr. Tondeur has $1\frac{1}{2}$ in. square pipes made by neatly welding two $1\frac{1}{2}$ in. angle iron lengths longitudinally.

Other interesting devices to be seen at Lechlade Mill include an electric punt, which Mr. Tondeur also fitted up himself to carry him up and down the river at speeds ranging from one to three and a half miles an hour. This boat, which can carry up to four people, is driven by a small electric motor and propeller, the whole unit being totally immersed in water, thus obviating cooling problems.

The motor is completely silent in operation. It can be quickly removed by loosening a nut and is kept out of the water when not in use. Running at one m.p.h., the motor draws 10 amps., and at $3\frac{1}{2}$ m.p.h., 20 amps, from two 6-volt car batteries—a source which gives a reasonable running time before recharging becomes necessary.

Mr. Tondeur seen in the electrically propelled punt

Problems and Practice

IN ENGINEERING

Direction of Fault

IN certain cases, it is possible to find the directional sense of a low resistance earth fault without cutting the lead sheath of a h.v. or l.v. cable and hence obviating the necessity of additional jointing. The majority of faults of this nature can be located accurately by loop tests, but where complications exist, as in the case of all cores open circuited and earthed, and an accurate test is not always possible, the following test for direction can be employed.

At the approximate fault position, a 1 ft length of the cable is exposed and a 1 in. copper braid is bound firmly on to the lead sheath to form a loop. An a.c. current is circulated through conductor and sheath (for a 100-ohm fault resistance a 2 kW radiator will give a suitable 2 amp) and a tong test ammeter is clipped on to the sheath. A current reading indicates that the fault is beyond that position since the braiding will shunt the return current through the sheath.

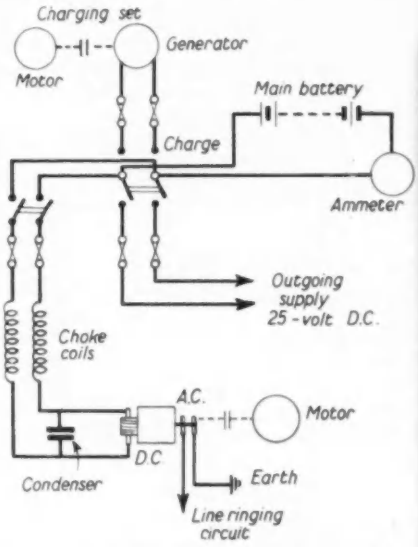
The method is particularly suited to plain lead-covered cables but can also be adapted for armoured cables by using armour clamps. In this case, after the test has been completed, the exposed sheath is enclosed in a wooden box and filled with a hard compound for mechanical protection.

The limitations of the test are many, since the fault resistance must be low to give a satisfactory tong ammeter reading and an a.c. supply must be readily available.—*K. G. W.*

Works Telephone Supply

IN some of the larger engineering works it frequently happens that a private telephone system is installed necessitating a certain amount of special plant. The case in point had a complete central generating plant for the private telephone system. This consisted of a battery set (25 V), one motor generator and a small converter set, with all the associated apparatus. To simplify matters a diagram of connections is given in the accompanying sketch.

The converter was driven by an induction motor and both d.c. and a.c. supplies were generated, the latter being necessary for the ringing or bell circuits. After a few weeks of continuous operation it was found that noises were being transmitted throughout the speaking circuits to such an extent as to be very objectionable. Attempts were made to trace out the system generally for interference, but nothing of importance was located. In due course, it was decided to commence at the



Diagrammatic representation of telephone system

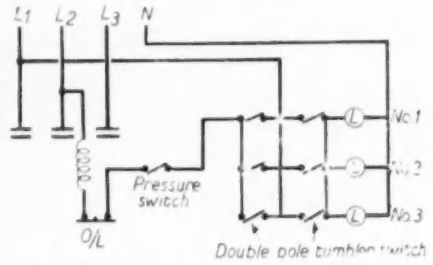
central station machines. The motor-generator which was used normally for charging was tried, and no interference existed, as was the case with only the battery in circuit. On connecting the converter set into circuit it was found that the interference was appreciable.

In order to get over this difficulty two choke coils were made and a number of tappings were brought out so that any necessary adjustment would be possible.

Additional to this, a condenser was added in circuit, the arrangement being as given in the diagram. After making a trial and error with the choke coils, it was found that the interference was entirely eliminated and normal conversation was once more possible using this telephone system.—*M.I.C.E.*

Compressor Control

A COMPRESSOR supplying air to departments on the ground and first floors is situated in the basement. As the air supply is only required at intervals it was decided to fit



Wiring diagram for compressor switches

a control point and pilot lamp in each department, so that the motor could be started without going down to the basement. The control point consists of a double pole tumbler switch and a small bayonet cap lampholder carrying a neon indicator lamp. The overloads in the starter were altered to manual resetting type and the wiring carried out as per diagram. It will be noted that no matter which switch is on, all the pilot lamps are alight and will remain so until all the switches are off. The control units are placed near the door, so that the last person to leave the department will see the light and make sure his switch is off. An advantage is the ease of extension of the number of points.—*T. Thomson.*

Power Failure

OVERLOAD on a 15 h.p. d.c. motor driving a mixing mill had blown a fuse. The attendant, being well used to such a happening, had switched off, opened the main switch, and replaced the fuse. Switching on again produced no current. Both fuses were then changed without result. It being obvious from adjacent running motors that the section c.b. was closed, the maintenance electrician was called in.

A check with a test lamp showed current at the switch terminals, but closer inspection disclosed that the fixed contact on one side of the switch had been forced open so that the switch knife blade failed to make contact when the switch was closed. It was noticed that most of the lamp-wick type of grommet was missing from the recess in the switch-lid. Questioning disclosed that half of the upper portion of the grommet had fallen into the switch as the lid was closed after the first fuse renewal.

Switching on had obviously forced the grommet between the blade and its fixed contact. On opening up the second time, the attendant had pulled the loose piece of grommet out of the switch and thrown it away. Needless to say, the control gear was situated in the darkest corner of the building. —*F. S.*

Fluorescent Flicker

A COMPLAINT was received that a fluorescent tube was seen to flicker from time to time when supposed to be switched "off."

The controlling 5 amp tumbler switch was therefore examined and found to be of the micro-gap type with self-aligning contacts. The switch appeared to be in good order and the supply a.c.

Subsequent tests revealed no tracking but vibration caused the self-aligning contacts to partially bridge-over allowing sufficient current to flow to heat the bi-metal strip in the starter switch but insufficient to completely ionise the gas in the tube.

As the point was situated in the window of a shop fronting a road carrying heavy traffic the cause of the flicker was evident and substitution of a q.m. and b. type switch cured the trouble.—*G. W.*

Theory in Practice

THE following incident, which occurred during my service in India, proved very troublesome at the time although it provided some amusement afterwards.

A report was received from the woodwork shop that a three phase motor driving a handsaw was running very hot. I sent an electrician to investigate and some time later he returned, saying that he could find nothing wrong, so I went along to see for myself. The motor was given a thorough check and no defect was apparent. An ammeter in one of the lines, however, revealed that the running current was greater than normal.

I decided to make a few enquiries and found that an Indian student had been working on the machine the previous day, so he was sent for. After much questioning and devious replies he admitted having altered the connections in the terminal box. It appeared that his last lecture at the technical school had been on star and delta connections so he decided to put his theory into practice and change the motor connections from star to delta.

Once they had been reconverted to star the machine gave no further trouble.—*J. P.*

Remote Control Systems

Aspects of Remote Supervision of H.E. Stations

ALTHOUGH hydro-electric power is small in quantity compared with steam-generated power as far as this country is concerned, the continued rise in fuel costs and the growth of demand has led to the recent exploitation of many comparatively small hydro schemes. These are usually in remote areas, and in order to ensure economy of operation and efficient use, several control systems have been developed. A general review of these systems was given last Thursday in a paper "The Control of Hydro-Electric Plant," presented to the Supply and Utilisation Sections of the Institution of Electrical Engineers by Messrs. A. C. H. FROST and W. BRITTLEBANK.

The types of control described included: manual control, cottage-attended control, semi-automatic control, fully-automatic control, supervisory control and light-current direct control.

Requirements

The primary elements requiring control were: (*a*) main water supply to the turbine, (*b*) runner water admission and relief, (*c*) the governor servo system, (*d*) load, (*e*) lubrication, (*f*) generator cooling (when provided separately), and (*g*) braking and jacking systems.

Owing to the diverse systems of powering auxiliaries many variations in detail on this side were possible. Generally, however, they consisted of a governor oil pump, a bearing-oil pump, a cooling water pump and a governor drive. In modern plant, the only auxiliaries which were coupled solidly were the exciters and the governor permanent magnet generators.

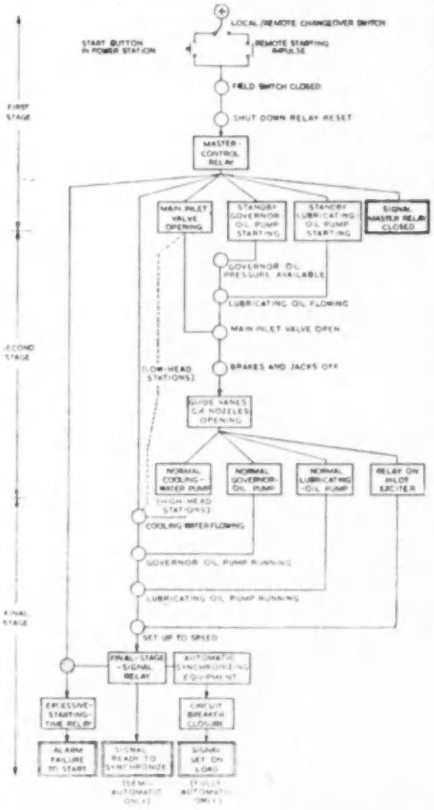
Electrically driven auxiliaries were of such small powers that a low-voltage supply was sufficient. The simplest way of getting this was from the main busbars through a transformer rated at about 250 kVA.

Methods of Control

Manual (mechanical) control is comparatively rare in modern stations, and where a station is operating on an isolated system, it is usual to leave it unattended for long periods, control being exercised by the turbine governors and the automatic voltage regulators. This reduces the staffing to one attendant and a relief man. It is important, however, to have a comprehensive alarm system which will warn the attendant in his cottage if anything goes seriously wrong or the load reaches the capacity of the running plant.

Dealing with synchronising, the Authors said that closing the generator at about 95% of full speed and then applying the field could be used with properly designed machines below about 5,000 kW ratings. Above that size it was necessary to use some form of automatic synchroniser.

The Authors then described systems of semi- and fully-automatic control which enabled machines to be run up to speed and syn-



This block diagram shows the sequential operations required to put a set on load

chronised by sequential operations. Electrical and mechanical protection was also discussed, and the authors thought there was a tendency to over-elaboration in the provision of shut-down relays. They thought that all main protective devices should operate on hand-reset relay only, and that these circuits should over-ride all hand and automatic controls.

General considerations applying to indication and remote control equipments were dealt with at some length, and the paper concluded with a general summing up of the factors involved.

DISCUSSION

MR. T. G. N. HALDANE (Merz and McLellan) said it was a characteristic of hydro-electric plant that it lent itself to simple control and rapid response to load requirements. The Galloway scheme had demonstrated the advantages of remote control and semi-automatic control.

MR. A. R. COOPER (B.E.A., Merseyside and N. Wales) suggested that the outstanding success of the semi-automatic control gear on the Galloway scheme was largely due to the very high quality of the maintenance. The shift staffing of steam power stations, even in urban areas, was becoming increasingly difficult, and it was still more difficult to get people to work shifts in isolated surroundings.

MR. A. T. MITCHELL (Boving and Co.), speaking from the point of view of the turbine maker, referred to the governor oil system and emphasised the importance of the oil pressure. A house set had the great advantage of being available at all times to carry all the local load of the station.

MR. F. H. WILLIAMS (B.E.A., Galloway) said that in the Galloway scheme, while the Glenlee station, of 24,000 kW, could be started up and be on full load on the grid in about three minutes, with the automatic stations it took more than twelve minutes to get away, because the first part of the starting up was the filling of the pipe-line.

Their governors were gear-driven, and they had never had any trouble with them. So far as electrical drive was concerned, their experience was that the fewer electrical gadgets there were on a hydro scheme the better. The atmosphere was always humid, and a certain amount of heating had to be put in to keep the electrical apparatus in good condition.

MR. E. M. JOHNSON (Metrovick) regretted that the paper had been confined almost entirely to the use of hydro-electric power to provide peak assistance to bulk generation by thermal plant. A very large part of the world's hydro-electric stations ran for the most part continuously, and did not possess the elements which the authors rightly emphasised as necessary for the type of power system which they described.

MR. B. DONKIN (Kennedy and Donkin) agreed with the Authors that station auxiliary sets were an expensive luxury. Loads had a habit of increasing more rapidly than generating plant, and in general it was more economic to supply local loads by enlarging the unit auxiliary transformers on the generators or on the line transformers.

MR. N. G. DENNIS made a number of detailed comments on the paper from the point of view of a turbine maker.

MR. J. F. FLETCHER (Standard Telephones) mentioned that the method of power station control known as light-current direct control was being increasingly used, and was employed for the largest of the new Scottish hydro-electric stations. Dealing with remote operation over long distances, he suggested that meter manufacturers and telecommunication engineers should get together to design an instrument to permit synchronising over considerable distances.

MR. H. HEADLAND (Kennedy and Donkin) thought the reference to pump storage schemes in the paper a little cursory, and suggested that the development of a machine which could operate both as a turbine and as a pump might easily change the economic case for pumped storage in this country.

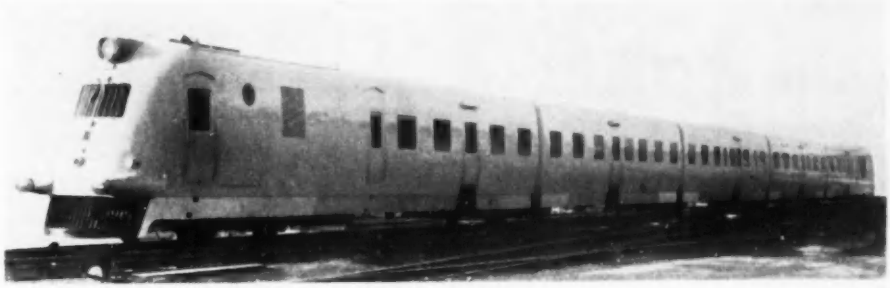
MR. G. GERARD, speaking as an operator, emphasised the need to keep electrical equipment in hydro-electric stations as simple as possible, and agreed that governors operated by belts worked very satisfactorily, while in some stations where electric motors were used for this purpose there had been several shut-downs as a result.

For governor oil pump operation the best arrangement was a small Pelton-driven oil pump to operate in an emergency or to run in parallel with the electrically-driven auxiliaries. Control circuits going to reservoirs should be routed so that they could not be damaged by a burst pipe or dam.

DR. J. H. WALKER said that there seemed to be no unanimity as to the best earthing system to adopt. Some specifications provided that machines should operate in parallel with two or more machines solidly earthed at the same time. That meant difficulties for the machine designer, because of the third harmonic currents involved. Resistance earthing was expensive and bulky. The alternative of earthing the neutral through a high voltage distribution transformer from which warning relays of earth currents could be operated could lead to trouble if this transformer and its associated apparatus were not correctly designed.

MR. J. F. SHIPLEY said that in installing hydro-electric plant in West Africa, his firm had found it more economical to install completely automatic stations, in spite of the difficulties due to dust, humidity and insects, than to have three white attendants at each station, which would otherwise be necessary. In the eleven years for which the plant had operated for twenty-four hours a day there had been only ten breakdowns, all of a minor character, which showed the great reliability of the automatic equipment.

The Authors replied to the discussion.



Cairo-Alex in Two hours!

Special lightweight articulated diesel-electric trains for Egypt

REMARKABLE for their lightness of construction and high power-to-weight ratio are the five-coach express trains now being built by the English Electric Co. and the Birmingham Railway Carriage and Wagon Co. for the Egyptian State Railways. The units have the low specific weight of 0·53 tons per foot run when ready for service, and form part of a series of orders amounting to over £3,000,000 placed with the English Electric Co.

General Arrangement

The power for the five-coach trains is supplied by two diesel engines, situated one at each end of the train. These engines are four-cylinder, pressure-charged units, employing direct mechanical injection of fuel and developing 400 h.p. at 750 r.p.m. Each is directly coupled to a main d.c. generator which has a separately excited field winding, a decompounding series winding, and a special starting winding which is used when the engine is being started from the batteries.

Power from each of the two generators is taken to two traction motors located on the motor bogies situated under the first and last articulations, making in all four traction motors per train. These are series wound reversible machines with self ventilation.

Governing of the engines is carried out in conjunction with the electrical control equipment which operates on the generator fields. A sensitive mechanical governor, fitted with hydraulic servo gear operates the fuel control shaft, and the governor loading is varied in steps by electrically-operated solenoids. These steps are arranged so that the engines are never running at or near the critical speeds. Automatic co-ordination between the solenoids and the variations of the generator field ensures that the maximum electrical loading is limited to correspond with the available engine output.

The overall length of a five-coach train is 255 ft 3 in., with an overall width of 9 ft 6 in. Total laden weight is about 152 tons and passenger-carrying capacity 172 passengers. On a trial run, from Birmingham to Droitwich last Sunday, the train attained a speed of 76 m.p.h. with ease, and showed remarkable steadiness and smoothness. Two classes of passenger accommodation are provided, 60 seats being in the first and 112 in the second.

The train is due to run on the Cairo-Alexandria route, and is scheduled to cover the 130 miles in 2 hours 10 minutes, including stops.

Interior of the drivers' cab shows convenience of controls

overseas news

Trinidad Results

The Trinidad and Tobago Electricity Commission collected $174,610.59 in revenue last year, more than in 1948, according to the annual report of the Commission for the year ending December 1949, just published. Total revenue obtained during last year was $1 523,106.97, as compared with $1,348,496.38 for the previous year. Of the former figure, $49,404.64 was in respect of supplies for domestic light and power—the largest contributor, while bulk supply for the Port-of-Spain Corporation Board contributed $44,435.03. Total operating expenditure for last year was $1,420,966.92, an increase of $97,647.61 over the 1948 figure.

Clarence River

Electricity sales during 1949 by the Clarence River County Council, New South Wales, amounted to over 50½ million units, an increase of 10% over 1948. Total revenue for the year was £359,919, including £32,343 from the activities of the Sales Department. Output from the Nymboida hydro-electric station was over 36 million units—its highest yet—the station being run at full capacity except for a short period. Work is proceeding on the Koolkham steam power station, for which a further 7,500 kW set has been ordered, and the 1,000 kW diesel set at Lismore power station is now running. Meanwhile the scheme for the hydro-electric development of the Clarence River is still under consideration.

Plant for Morwell

Plant for two additional briquetting factories at Morwell, Victoria, is to come from Germany, the Minister for Electrical Undertakings, Mr. Dodgshun, announced recently. Three water-tube boilers, with fittings and buildings, were to come from London. They would cost £1,461,185. Two back-pressure turbo-generators, also for the Morwell briquetting project, would be brought from Manchester, at a cost of £545,854, he said.

Queensland Development

By a process of amalgamation, and by the establishment of regional electricity boards, the number of electricity supply authorities in Queensland has been reduced to 37, we note in the 13th annual report of the State Electricity Commission, just received, which adds further information to that given in our November 9 issue. There are now five Regional Electricity Boards in the State. The Wide Bay Board sold 17·2 million units—an increase of 13·77%, and had 13,133 consumers. The South Burnett Board sold 2·9 million units, to its 2,646 consumers; the Townsville Board sold 31·8 million units, and had 13,986 consumers; Capricornia Board sold 23·9 million units and had 13,736 consumers, while the Cairns Board sold 27·4 million units to ts 11,904 consumers.

The Commission's efforts to promote a system of uniformity of approval of electrical equipment has resulted in the formulation of a scheme on those lines which has been agreed to by all the State Regulatory Authorities. To date the apparatus and appliances which now must be approved before being offered for sale in Queensland are: toasters, grillers, radiators, portable immersion heaters, kettles, saucepans, jugs, irons, plugs and sockets, switches, connectors, soldering irons, lampholders, handlamps, adaptors, flexible cords, razors, lamp standards, and portable cookers.

220 kV Line

Work has started on the 220 kV transmission line running from Kiewa to Melbourne, Mr. R. A. Hunt, chairman of the State Electricity Commission of Victoria, announced last month. Excavations have been sunk for some of the first towers at the Kiewa end of the line, he said, and it was hoped to begin assembly soon of the 600 towers needed to carry the 152 miles of line. The transmission line will cross Eildon Reservoir in an unbroken span of more than 1¾ miles, one of the longest cable spans in the world.

The Metals Position

Appliance manufacturers in Canada and the U.S.A. are concerned at the serious effect a shortage of base metals would have on the industry, according to reports. The co-proprietor of a Canadian appliance firm has stated that steel specially treated in the U.S. for construction of cookers and washing machines, is scarce. He considered that the metal now being manufactured was of an inferior quality. That was one of the reasons why porcelain, in some cases, failed to adhere to cookers and washing machines, he alleged.

More Power

Construction of the new transmission line between Brooklin and the Scarborough frequency changer and transmission station is being accelerated to hasten delivery of more power from the new Chenaux plant on the Ottawa River to a wider area of Southern Ontario (the chairman of the Hydro-Electric Power Commission of Ontario—Mr. R. H. Saunders—has stated). The first 20,000 h.p. unit is expected to be in operation any day now, with a second unit following shortly afterwards. In all there are to be eight 20,000 h.p. sets, which are expected to be commissioned during the next ten months.

Plant for Jones Lake Scheme

Contracts totalling $1,217,000 for plant for the new hydro-electric project at Jones Lake, 80 miles east of Vancouver, have been placed this month by the British Columbia Electric Co. The firms concerned, who are to supply the turbines and generators, are the Vancouver Engineering Works and the Canadian General Electric. This Jones Lake development is to have a capacity of 80,000 h.p. and is scheduled for completion in 1952. It will utilise a head of over 2,000 ft., the highest water head of any hydro-electric project in Canada, it is claimed. A 230 kV transmission line is also to be erected.

Planning Ahead

During the course of a statement on the work so far done by the National Planning Commission, Pandit Nehru, Prime Minister of India, said the Commission had recently addressed a communication to States Governments on the subject of development of irrigation and power resources in which it was suggested that problems in that field should be viewed in the perspective of a period such as 15 years. Suggestions for financing irrigation and power development had also been made. The mineral resources of the country, especially coal, mica and manganese, had been studied in the Natural Resources Division of the Commission in consultation with the Ministries concerned. One of the problems to which special attention was being paid was the conservation of high-grade metallurgical coal. The Division was also engaged in reviewing the recommendations of the Scientific Manpower Committee in terms of the prospects of development in different industries so that a suitable programme for developing scientific and manpower resources could be framed.

Roumania's Plan

A ten-year plan for the electrification of the country has been launched by the Roumanian Government. Its implementation begins this month. The plan aims at increasing generating capacity to 1,660,000 kW in the first five years. Water power will increase from 8% to 17½% of the total. The plan also provides for the building of 24 hydro-electric power plants generating 764,000 kW. State and collective farms will be first among 2,000 villages to get light and power. The plan seems to have three particular objectives. One is to reduce the use of petroleum for generating purposes in order to conserve it for the chemical industry and the armed forces; another is to "raise in a relatively short time the country's defensive power," as the Deputy Premier expressed it in his report; and, thirdly, it is hoped to provide one or more incentives for the peasants to join the farm collectives, because of the preferential treatment they will receive when light and power becomes freely available to the majority of villages.

This year Roumania's 603 power-plants have a total capacity of 600,000 kW. There are only 1,500 miles of transmission lines in the country, serving altogether 28·7% of the population. Four hundred and thirty of 13,000 villages have no electricity. At present 70% of the power produced is generated from oil and natural gas, only 8% being from hydro-electric power.

Extension at Salisbury

Performing the official opening ceremony of the second stage of Salisbury's (Southern Rhodesia) second power station a few days ago, Councillor M. Jaffray, chairman of the Corporation Public Works Committee, referred to it as being one step nearer the day when the undertaking would be able to supply all consumers' requirements. It was hoped that stage two would be finished by the end of 1953, while stage three, for which plant is on order, should be ready by the end of 1953, he said.

Christchurch's Good Year

During the year to March 31 last a net increase of 1,531 domestic electric cookers were connected to the supply of the Christchurch Electricity Department, New Zealand, according to the annual report just to hand. The total connected at the end of that period was 26,288. There were also 24,498 domestic water heaters and 531 commercial and industrial water heaters connected. Due to the difficulty of obtaining house service meters, an unmetered supply had to be given to many water heaters, but regular supplies of meters are now being received and good progress is being made with the work of installing them. The total number of units sold was over 230 millions, an increase of 14·8% over the previous year, but this included a full year's supply to an area taken over from the State Hydro-Electric Department. The year's working of the Christchurch undertaking resulted in a surplus of £43,505, which, considering the restrictions on power supplies, may be considered very satisfactory. Revenue from domestic supplies, at an average of 0·561d p.u., amounted to £363,226, while commercial users provided £132,166, at an average of 1.319d. p.u., and industrial concerns £112,038 at an average of 0·67d. p.u. Total costs per unit sold worked out at 0·616d. for the year, with a corresponding revenue figure of 0·658d. The undertaking is, of course, still limited in its bulk supply from the State Hydro-Electric Department.

Electric Barges

A new type of electrically-driven barge which will get current from power lines placed along waterways has been built in Russia for use on the new irrigation canals under construction in Turkmenia, Ukraine and Crimea, according to a report. Operating costs will be half those of any other type of barge. The transmission lines will also be used to supply tractors and other agricultural machinery.

PERSONALITIES

IN THE INDUSTRY

Last week, **Mr. T. Eckersley,** A.M.I.E.E., A.M.I.Mech.E., left this country by air to take up the post of power station superintendent of the Owen Falls hydro-electric station of the Uganda Electricity Board. Mr. Eckersley was previously with the London Division of the B.E.A. at Deptford generating station, and for some years before that served with the Calcutta Electric Supply Corporation, Ltd. His address is now c/o The Board, P.O. Box 559, Kampala, Uganda. The Owen Falls station is to have an initial installed capacity of four 15,000 kW sets, with an ultimate capacity of ten such units.

Mr. T. Eckersley

Prof. T. D. J. Leech, head of the faculty of engineering at Auckland (N.Z.) University College, has now taken up duties as chief engineer of the scientific services branch of the Snowy Mountains Hydro-Electric Authority, Australia.

Newly appointed manager of the Plant Division, Manchester, of Crompton Parkinson, Ltd., is **Mr. L. C. W. Turner,** who previously held a similar post at the firm's Belfast depot. At Belfast, **Mr. A. G. Graham,** A.M.I.E.E., is now the manager. Mr. Turner served an apprenticeship at the Chelmsford works of the company, subsequently becoming a junior sales engineer of Plant Division, London, in 1935, and a sales engineer at Birmingham three years later. After war service, he rejoined the company as switchgear sales engineer, and was appointed manager of the Plant Division, Belfast, in January, 1949. Mr. Graham has been with Crompton Parkinson since August, 1948, as a sales engineer in the Plant Division, London, having gained earlier experience with Asea Electric, Ltd.

Mr. L. C. W. Turner

Mr. A. G. Graham

Formerly consumers' engineer, Cheltenham District, Midlands Electricity Board, **Mr. H. Davies,** A.M.I.E.E., has been appointed sub-area senior development assistant, No. 1 Sub-Area, Merseyside and North Wales Electricity Board.

Wm. Sanders and Co. (Wednesbury) Ltd. have appointed Mr. G. Allin as district engineer in Burton-on-Trent, Uttoxeter and Peterborough and the counties of Lincoln, Nottingham, Derby, Leicester and Rutland.

The Liverpool district of No. 1 Sub-Area of the Merseyside and North Wales Electricity Board, has been divided into three districts. In the Liverpool Central district, **Mr. F. W. H. Langton,** A.M.I.E.E., A.M.I.I.A., is the district engineer (he was formerly assistant district engineer, Western Sub-Area, London Electricity Board), with **Mr. H. J. Fraser,** M.I.E.E., as district commercial officer. Mr. Fraser was formerly sales and service superintendent, Liverpool District, No. 1 Sub-Area, Merseyside and N. Wales Board.

For the Liverpool North District, the district engineer is **Mr. W. H. Hughes,** A.M.I.E.E., A.M.I.I.A., (formerly district engineer, Gravesend, South Eastern Electricity Board), and the district commercial officer is **Mr. W. Wallwork,** A.M.I.E.E. (until recently district consumers' engineer, Walsall, Midlands Electricity Board).

In the Liverpool South District the district engineer is **Mr. A. R. Cooper,** A.M.I.E.E. (formerly assistant district distribution engineer, Portsmouth, Southern Electricity Board), and the district commercial officer is **Mr. G. J. Bulmer,** M.B.E., T.D. (previously assistant sales and service superintendent, Liverpool District, No. 1 Sub-area, Merseyside and N. Wales Board).

Mr. T. C. Macnamara, A.M.I.E.E., has been appointed to the Board of Scophony-Baird as director in charge of engineering and production. He was, until recently, with the B.B.C. where he was concerned with the erection of the Alexandra Palace and Sutton Coldfield television stations.

Elexcel Ltd. are now represented in the South Wales area by **Mr. C. Jones,** who will operate from 24 Tydfil Place, Roath Park, Cardiff. Previously he was Cardiff area sales manager for Callenders Cable & Construction Co., and recently South Wales manager for Simplex Electric Co.

The Minister of Fuel and Power has appointed **Clr. S. E. Stickley,** of Coulsdon, **Alderman W. Southwell,** of Worthing, **Clr. W. B. Adams,** M.I.E.E., of Hassocks, **Miss M. A. Coward,** B.A., of Tonbridge, and **Mr. M. Lane,** of Surbiton, as additional members of the South Eastern Electricity Consultative Council. **Mr. S. B. Till,** of Brighton, has resigned from that Council.

Mr. G. D. Lee at present acting official secretary and senior clerk at the Queensland Agent-General's Office in London, has been appointed secretary of the State Electricity Commission of Queensland.

One of the two new governors of the British Broadcasting Corporation announced last weekend is **Mr. I. A. R. Stedeford,** who has been chairman and managing director of Tube Investments Ltd. since 1942. This new appointment is for one year, from January 1 next.

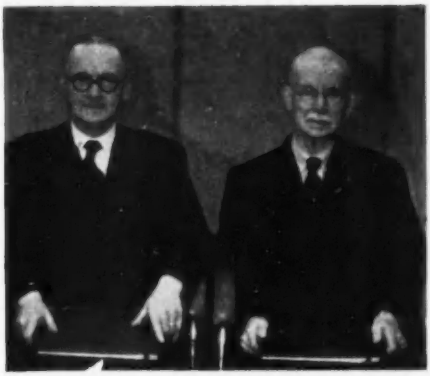
Col. H. Sleeman, E.D., M.I.Mech.E., M.I.E.E., M.I.E.Aust., Fel.A.I.E.E., whose appointment as manager of the Townsville Regional Electricity Board, Queensland, we noted on November 23, takes up his new duties early next month, he tells us. His new address is c/o Box 523, Townsville, Queensland, Australia.

Mrs. R. Messenger, M.B.E., J.P., whose name is well-known in the electrical industry, has been appointed Town Reeve of Bungay, Suffolk, for next year. She is the first and only woman to hold this ancient office, and this is her second term, the first being in 1937. She is a Life Feoffee of Bungay. The office is unique in England, for it confers dictatorial rights over the Town Purse. Mrs. Messenger is Adviser on Women's Work to the Eastern Electricity Board, and a member of the E.A.W. National Advisory Council. She is, of course, the sister of Dame Caroline Haslett.

Mrs. R. Messenger

After 39 years service in the electricity supply industry, **Mr. T. A. Taylor,** A.M.I.E.E., recently retired from the position of deputy manager, Hastings District, South Eastern Electricity Board. To commemorate the occasion, the district manager, **Mr. J. Savage,** presented him with a full chronometer watch subscribed for by members of the staff and employees. Mr. Taylor went to Hastings in 1923 as mains superintendent and was promoted to deputy borough electrical engineer in November, 1945, taking over the position of deputy manager of the undertaking at vesting day. Earlier, he had served with the Stalybridge, Hyde, Mossley and Dukinfield Tramways and Electricity Board, and with the undertakings of the Hammersmith, Sunderland and Fulham councils.

At an informal gathering of long-service employees of Premier Electric Heaters Ltd., recently, **Mr. George H. Collins** and **Mr. Herbert F. Collins,** who retired from the managing directorship of the company a few months ago, were presented with illuminated addresses, made up in the form of Books of Remembrance. Fine examples of the artists' skill, the addresses spanned the years from 1907, when the company



Herbert (left), and George Collins, of Premier, with their presentations

was established, to the present day, in illustration and word, and include lists of "Premier" employees in this country and all over the world.

A memorial service to the late **Mr. Percy Good,** C.B.E., F.C.G.I., M.I.E.E., is to be held at St. Martins-in-the-Fields, London W.C.2, on December 18, at 12.15 p.m.

OBITUARY

Many of our older readers will regret to learn of the death on December 5, of **Mr. J. H. Johnson,** M.I.E.E., aged 71. Affectionately known as "Johnnie," he joined Crompton and Co., Ltd., at the Arc Works, Chelmsford, in May, 1903, having previously served an apprenticeship with Johnson and Phillips, Ltd., with subsequent training at A.C.E.C., of Charleroi; Kolben and Co., Ltd., Prague, and the Langdon-Davies Motor Co., Ltd. He held several appointments in the Chelmsford Works and London Office over his 45 years of service with Crompton and Co., Ltd. and Crompton Parkinson, Ltd., after which he retired from executive duty and remained on a consultative basis. He was associated in the inauguration of the early Crompton Engineering Society and, latterly, the Chelmsford Engineering Society, of which he was president in 1934-35. He was for many years treasurer of the Cromptonian Association. For some years he had served on the Court of Governors of the I.E.E. He was editor for a number of years of the *Electrical Engineer's Year Book*, and in 1911 published a book on arc lamps and accessories. Mr. Johnson was closely associated with the late Col. R. E. B. Crompton, and collected many examples of his early work.

WILLS.—Mr. Frank Hope-Jones, M.I.E.E., F.R.A.S., formerly managing director of Synchronome Co. Ltd., left £3,836 (£3,393 net value).

Mr. D. S. Munro, M.I.E.E., formerly of Edinburgh, who patented many safety devices, left personal estate valued at £20,784.

Mr. A. Gowans Whyte, formerly a well-known electrical publicist, left £6,907 (£6,826 net value).

AREA BOARD HIGHLIGHTS

Notes on the Regional Activities of British Electricity

DIFFERENCES in the types of consumer served by the 14 Area Boards naturally lead to considerable variation in their annual reports, both in form and in relative emphasis on the many aspects of the year's work. Some common themes can, however, be found and outstanding amongst these is concern at the capital expenditure restrictions announced during the year under review. As has been remarked elsewhere, these cuts affect transmission and distribution more than generation, and so it is the Area Boards with large rural development plans that have complained most emphatically.

The back log of schemes, deferred during the war, again absorbed most of the engineering resources of the boards, and details of the reinforcement of primary networks figure in almost every report. In many cases the concentration of ownership resulting from nationalisation has enabled considerable economies to be made in this field. The changeover of consumers to the standard 240 V 50 c/s supply has also made headway, but it is regarded as of secondary importance by most of the boards compared with the other tasks confronting them.

Consultative Councils have some matters of interest to report in most of the areas, but nearly all express the feeling that their existence, duties and powers are not sufficiently widely known for them to be fully effective.

London

Extensive system reinforcement was planned during the year, but the work of realising these plans was delayed by the Government's limitation of capital investment, and by the close link-up in London between the Board's h.v. lines and those of the Central Authority. In all, 107 MVA of transforming plant was brought into operation, and 14 main bulk supply points were commissioned. Control of h.v. system was successfully centred at the Streatham Control Centre.

To improve consumer service, more service centres are planned, while the provision of modern electrical equipment to 400 schools for domestic science training should help future consumers. Contracting activities were much increased following the acquisition of Central London Accessories, Ltd., from the Central Authority.

To provide data for tariff standardisation, a survey of existing consumers on a sampling basis was instituted.

South Eastern

High unit sales for domestic applications characterise this area and attention was directed to a more diversified and expanded sale of units. Emphasis on switch-controlled off-peak water heating was an example of this policy. To improve local service to consumers, several districts have been reorganised, and the total number reduced from 55 to 36. Agency agreements with local authorities were all terminated, and the Board set up its own legal department.

A five-stage plan for future development has been drawn up, and certain details of engineering design fixed as policy, e.g. simple h.v. outdoor equipment and switch-fuse control of transformers. Sub-area control centres are being established as inter-connection proceeds.

The maximum demand occurred on a Sunday, due to the cooker load, and a tariff adjustment was negotiated with the Central Authority to take account of non-coincidence with the national peak. Unit charges to consumers were reduced in some cases, and a standard scheme of service charges adopted. As a matter of principle, the Board has expressed a preference for a two-part tariff based on size of premises, but tariff standardisation is not yet complete.

Southern

Reorganisation of the area into 23 single-headed districts was the outstanding change of the year. Also of great importance was the adoption of a standard basis for the domestic tariff—a variable two-step block scheme, based on the number of assessable rooms.

Notable in the list of engineering work completed during the year are an extension of the transmission system to feed London Airport, and the establishment of a 33 kV distribution system

AREA BOARD COMMERCIAL AND ENGINEERING STATISTICS 1949-50

	Consumers at March 1950	Increase during year	Net* Maximum demand	Average§ Load factor	Increase circuit in length of h.v. mains	Consumers changed to standard a.c. system
	'000	'000	MW	%	miles	
London	1,566	42	1,393	36.7	96	8,701
S.E.	925	32	610	42.1	292	5,428
South	958	41	767	41.4	371	2,941
S.W.	553	24	414	38.7	143	414
East	1,285	53	1,078	42.0	493	5,468
E. Midlands	968	33	923†	43.6	239	7,648
Midlands	1,013	43	1,258	42.7	303	8,446
S. Wales	459	15	538	54.4	121	1,659
M. and N. Wales	684	23	684	49.3	107	5,469
Yorks.	1,153	35	1,187	45.8	232	1,770
N.E.	730	28	675	52.6	253	4,230
N.W.	1,338	38	1,396	41.9	136	4,417
S.E.S.	315	18	248	45.3	97	2,159
S.W.S.	695	26	644	45.1	192	353,853
Total	12,632	451	—	—	3,075	412,603

* After allowing for sales to other Area Boards. † Excluding supplies from and to other Area Boards. § Based on net purchases.

on the Isle of Wight. The Board's proving house operated throughout the year, and manufacturers of electrical equipment accepted its recommendations for modifications to 44 appliances.

The high coal charge paid on all current supplied by the Central Authority is under discussion, since more than half the units purchased are generated in stations which carry a lower coal cost.

New showrooms were opened in three towns.

South Western

Consciousness of the excessively rural area it supplies again permeates the report of this Board. The ratio of capital employed to income was 9 : 4, compared with 5 : 3 ($6\frac{2}{3}$: 4) for all Area Boards combined. A hire purchase scheme was introduced to encourage off-peak use of power, and with a rebate scheme for rural line-rentals was expected to improve the load factor. A block tariff, with the first step based on number of rooms, was under investigation as a new standard domestic tariff.

Reinforcement of the primary 33 kV network proceeded, and a central construction department was set up to deal with major extensions. Amongst other work was the construction of a new distribution centre at Bristol. Line outages averaged 2/100 miles/year.

Administrative reorganisation, reduced the number of sub-areas from five to four, and divided the area into 20 districts, each with a single manager responsible for all matters. Sub-areas consequently became virtually administrative, with no operational duties.

Eastern

Preliminary work was carried out for the establishment of six new bulk-supply points, and several schemes for war-delayed reinforcements to the 33 kV system were completed. The six new towns in the area attracted much planning effort, and a considerable amount of attention was given to system planning in general.

Sales of electrical appliances and the amount of installation work executed for consumers increased notably during the year. The general experience of operation confirmed the earlier decision to decentralise. To emphasise the peak problem, the Board discontinued the sale of electric fires.

Investigation on tariff structure proceeded during the year, and preparations were made for the introduction of a more uniform tariff.

East Midlands

Purchases of electricity from steel and gas companies in the area are noted in the report. Two new Central Authority bulk supply points were established during the year, and three more intake points were planned. Arrangements were made for the transfer of certain 33 kV lines from the Central Authority to the Board, and as part of area planning, some 6·6 kV lines were changed to 11 kV operation.

Load spreading was helped by the operation of stand-by generators at R.A.F. stations in the area during peak hours, but load-shedding procedure was complicated by line stability problems. Provisional approval was given to a two-step block tariff, assessed on number of rooms, as a standard domestic tariff. A sampling survey of existing tariffs was undertaken to determine the effect of such a change.

Collection of accounts was undertaken directly by the Board even when rooms had to be hired for odd days for the purpose. The direct contact with the consumer resulting was considered to make this worth while.

CONTRACTING AND SALE OF FITTINGS BUSINESS

Board	Hire purchase sales	Other sales*	Change in value of work in progress†
	£	£	£
London	**420,370**	**1,454,247**	**116,785**
	189,669	1,420,277	7,445
South Eastern ...	**293,180**	**1,242,520**	**−20,835**
	85,466	1,177,431	26,145
Southern ...	**381,707**	**1,872,496**	**−23,641**
	147,096	1,675,475	−16,207
S. Western ...	**318,853**	**894,964**	**12,618**
	20,734	931,703	−40,084
Eastern	**1,301,075**	**2,555,895**	**− 7,427**
	575,328	2,321,235	32,781
E. Midland ...	**421,354**	**1,021,310**	**−4,342**
	113,370	1,017,919	13,884
Midlands	**572,283**	**1,390,428**	**45,074**
	144,936	1,262,158	35,841
S. Wales	**123,068**	**630,621**	**15,881**
	18,802	536,757	482
M. and N. Wales	**268,043**	**652,458**	**25,593**
	58,346	728,853	−44,051
Yorkshire ...	**448,082**	**1,161,164**	**21,146**
	104,588	972,221	83,120
N. Eastern ...	**35,839**	**734,119**	**84,894**
	13,766	702,360	21,525
N. Western ...	**471,037**	**1,369,603**	**56,093**
	177,181	1,368,906	75,194
S.E. Scotland ...	**75,635**	**309,083**	**−3,748**
	5,636	202,960	12,552
S.W. Scotland ...	**22,435**	**292,486**	**9,851**
	Nil	284,968	21,408

*"Other Sales" represents cash and credit transactions in the contracting and sale of fittings account.
† At end of year, compared with previous year.
Bold figures refer to 1949/50, light to 1948/49.

Midlands

Organisation of the area into seven sub-areas and 50 districts was completed during the year under review. In the engineering field system reinforcement was the major feature of interest, a 66 kV line for Herefordshire (Malvern Hills route) being of particular urgency. Three new bulk supply points were brought into operation during the year, and four more planned. Further work includes new 66 kV systems and the replacement of old vulcanised bitumen cables.

Meter testing stations were reduced from 18 to 9, but to give improved consumer service, 15 new service centres were opened.

South Wales

Continuous working is a special feature of many of the industries in the area, and this introduced unusual difficulties in load-spreading arrangements. A standard communication procedure was arranged which enabled very rapid reduction of load to be obtained in case of need. To improve supply conditions, five new bulk supply points were planned, and three 66 kV and 33 kV transmission schemes were completed. Work was begun on three such transmission schemes.

A plan was drawn up to provide a rural transmission network that would bring almost all farms

and villages within 1½ miles of a h.v. line. It was not possible to begin constructional work on this scheme.

A uniform credit sales scheme is noted as having been well received, while consumer relations were further bettered by the opening of four new service centres. The introduction of a two-step block tariff was actively investigated.

As a step towards administrative economies, many specialist services were concentrated at sub-area level.

Merseyside and N. Wales

Administrative reorganisation was completed during the year, and the Board took over from local authorities the collection of all accounts. At the end of the year, 56 service centres were operating. On the engineering side, attention was focused on system reinforcement, the largest scheme being in Liverpool, and involving the laying of six 33 kV cables from Clarence Dock power station. Another major problem was the reconstruction of a 20 kV network in north west Wales for 33 kV working.

During the year the first supplies under the rural development plan were delivered, but the plan was later slowed down by the Government capital cuts.

Fifty-six service centres were in operation by the end of the year, and they attracted much new appliance sales business. Hire arrangements proved popular with many consumers.

Yorkshire

Agreement was reached during the year for five new bulk supply points out of seven estimated to be required in the next three years. Design work included a 66/11 kV substation, which by special effort of all concerned, was brought into operation within 14 months of the consumer asking for a 20 MVA fully duplicated supply.

Long-term engineering work of interest included an agreement with certain transformer manufacturers that large transformers should be designed with much increased short-time ratings, and the replacement of long spans of one 33 kV o.h. line with cadmium copper to counteract atmospheric pollution.

Seven service centres were opened during the year. As a step towards a standard tariff, the Board decided to investigate the effect of introducing a variable block charge, the first block to depend on the number of rooms.

North Eastern

Revision of the double-headed district scheme resulted in the organisation of 29 commercial districts and 39 engineering districts, some commercial districts including two or three engineering organisations. One new service centre was opened, and several more planned, though capital cuts made such advances difficult.

Tariff standardisation proceeded, though no steps were taken in connection with domestic charges. Active consideration was given to pre-payment meters and the more frequent collection of electricity accounts to help the poorer consumers. Hiring out of appliances ceased, but a uniform hire purchase scheme was introduced. Arrangements were pushed ahead for centralised control of the h.v. system, and several schemes for 66 kV network extension and reinforcement were commenced. Metering methods were standardised, and a mechanised method of recording meter particulars introduced.

During the year a considerable amount of constructional work in generating stations was undertaken by the Board's staff.

North Western

Reinforcement to existing networks attracted much of the attention of the engineering sections. A new 33 kV substation was commissioned at Burnley.

Plans were prepared for collecting information for domestic tariff standardisation, and a more attractive and uniform street lighting tariff was introduced. There were many examples of change-over to up-to-date methods of street-lighting. Further forms were connected, and except in the north of the area, there were few villages without a supply.

Arrangements were made for the Central Authority to supply the British Railways' Manchester-Sheffield scheme with current via the Board's network.

One new service centre was opened and work was started on four others. During the year a standard hire-purchase scheme was introduced, and the appliance-testing laboratories of the Board investigated some 400 items of equipment.

South-East Scotland

A notable innovation during the year was a special "off-peak" battery charging tariff, designed to encourage the use of electric vehicles. The sale of household appliances was helped by arranging for housecraft advisers to pay routine visits to all houses with recently installed cookers. Thermal storage methods of space-heating were also investigated and encouraged. Four new service centres were opened, and premises obtained for two more.

There was a 50% increase in engineering constructional work, and a combined scheme for Grid and area board transmission reinforcement was adopted.

During the year prolonged and involved discussions took place with the Central Authority and the Minister of Fuel and Power regarding the disposal of pre-vesting day reserves.

South-West Scotland

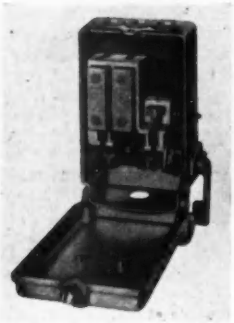
Contracts were placed for network reinforcement work in four of the five sub-areas, and some voltage standardisation work was completed. Standard specifications were prepared for many items of equipment, and there was further standardisation of engineering practices. Bulk purchasing of meters and insulators was introduced.

In the commercial field a two-step block tariff was announced to apply for the whole area, the first step being based on assessable rooms. Five service centres were remodelled, two new ones opened, and premises acquired for eight more.

The BUYER'S *Column*

Sanders' New Fusegear

NEW production by WM. SANDERS AND CO. (WEDNESBURY) LTD., Falcon Electrical Works, Wednesbury, Staffs, is the range of single-pole and neutral switch and fusegear which they are now marketing as a standardised line. All gear incorporates "Duplex" fuses, which, originated by Sanders, have a base common to two types of carrier, one for the cartridge fuse link and the other the rewireable cleat pattern.



Sanders' 401RC unit for s.p. & n. switching

Catalogue No. N101R is the "Sandalite" metalclad 15 amp switchfuse with slotted entry arranged for incoming cables to enter at the bottom and for cables to leave at the top. List price (consolidated) is 8s. 9d. each. No. N101RC is similar but has a ¾ in. conduit knockout in the bottom and three ¾ in. knockouts in the top. List price of N101RC is 10s. 6d.

No. N401R is the "Sandalite" metalclad S.P. & N. splitter with slotted entry. Switchfuse consists of a 21 amp main switch and two 15 amp outgoing fuses and two outgoing neutral ways. It is possible with this pattern to use up to 7/·036 V.I.R. for the outgoing cables. Consolidated list price is 11s. 3d., and for the N401RC, a similar type arranged for conduit entry, price is 14s. 9d.

Versions of the patterns noted above but fitted with moulded bakelite covers on porcelain bases are the 101G at 9s. 1d., and No. 401G at 10s. 6d.

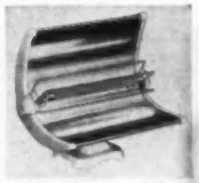
"Gripper" Lamp Prices Increase

PROUD of the fact that for four years the prices of their "Gripper" handlamps have not changed, the BRITISH CENTRAL ELECTRICAL CO. LTD., 6 and 8 Rosebery Avenue, London E.C.1, announce that they were compelled to introduce new prices for these lamps which took effect as from Monday, December 11. Discounts remain unaltered. Prices are now as follows:—

"Standard" handlamp,	20s. 0d.	(formerly 18s. 4d.)
"Super" ,,	29s. 0d.	(,, 27s. 4d.)
"Wellglass" handlamps	33s. 8d.	(,, 32s. 0d.)
"Baby" ,,	10s. 6d.	(no change)
"Navy" ,,	10s. 0d.	(,,)

The "Four-ten" Fire

THE ARORA COMPANY, of Roseberry Street, Loughborough, have recently redesigned their 1 kW reflector fire and have renamed it the "Four-ten" fire. It is basically the same as their model Catalogue No. 373. The same type of 1 kW element and the same reflector are used, but the sides have been redesigned and are now made in aluminium alloy. This new model is now in production and will be available in limited numbers shortly. Price is 52s. 6d. plus purchase tax.



Arora's "Four-ten" fire

A British Domestic Deep Fryer !

COMING on the market very shortly is a new electric deep fryer which will be particularly suitable for the larger family or small cafe.

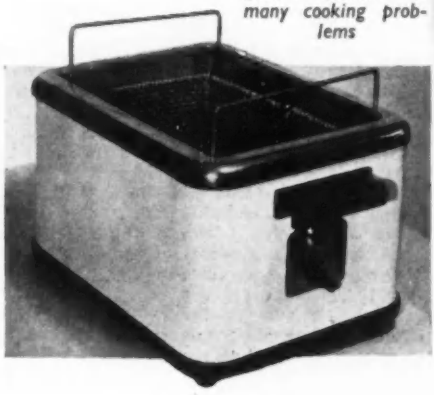
It will be introduced by ELECTRO-TECHNICAL INDUSTRIES LTD., 16 Berkeley Street, London W.1, and will solve many cooking problems when catering for up to a dozen people.

Deep frying of fish, chipped potatoes, meat croquettes and poultry are amongst the variety of uses of this new unit.

It is attractive in appearance, efficient and economical in operation. Durable white enamel is used for the finish. The well is of die cast aluminium, is 12 in. long by 5 in. by 8 in. and fitted with a wire basket with non-drip attachment.

Thermostatic control ensures that the oil or fat is kept at the right temperature (365°-400° F.). It is rated at 2 kW and is for a.c. supplies 200/250 V and 100/110 V. The unit is supplied with a lid, which is not shown in our photograph.

E.T.I's solution to many cooking problems



Smaller Silica Lamps

TWO other E.L.M.A. firms which announced the introduction of 40 W and 60 W sizes in the silica sprayed filament lamps are B.T.H. "Mazda" (SILVERLIGHT) and SIEMENS ELECTRIC LAMPS AND SUPPLIES (SILVALUX). Prices are as before, 2s. 7d. including tax for the 100 W size and 40 W and 60 W sizes, 2s. including tax.

New "Mary Ann" Iron

THE new model "Mary Ann" iron which is being released this month by THORN ELECTRICAL INDUSTRIES LTD., 105 Judd Street, London W.C.1, retains the exclusive feature of being double-pointed but has some interesting new features. These include a pilot lamp and an improved handle which can be removed and replaced within thirty seconds, thus considerably facilitating quick servicing. Removing the handle gives easy access both to the pilot-lamp and the cable terminations.

Thorn's "Mary Ann" iron now has a pilot light

Another feature which will please the service engineer is a unified thermostat assembly mounted on to the pressure plate; this unit can be easily removed complete, with the element, without disturbing the thermostat settings, thus enabling the element to be replaced in a very few minutes.

Features which remain unchanged include a vitreous enamel finish which is heat-resisting, does not discolour, and is easily cleaned with a damp cloth. The weight of the "Mary Ann" is 5 lb. accurately balanced for overall efficiency. The iron has an electrical loading of 750 watts and is supplied complete with a simplified stand at the inclusive price of 39s. 6d. for the a.c. model and 42s. for the a.c./d.c.

A Ten-way-and-off Rotary Switch

AN interesting rotary switch developed for meter switching and designed to overcome inconsistent contact resistance, inaccessibility and double tier terminations is the "Kabi-Austinlite" 10-way-and-off d.p. rotary switch, which has been introduced by PRECISION COMPONENTS (BARNET) LTD., 13 Byng Road, Barnet, Herts.

The use of raised air-spaced contacts with silver plated wiping action and the line contact system ensures a consistent performance by avoiding the possibility of dirt as on fixed contacts.

Construction makes dismantling an easy job, there being an unimpaired view of the switch action and contact condition. Connections are such that all terminals are arranged on a single plane near the panel, a neat arrangement which does not obstruct the contacts. These are numbered and arranged for easy identification.

The switch can be used as a tapping switch on a non-inductive circuit or can be arranged as a 10-way-and-off d.p. or 20-way s.p. switch with two positions. Maximum rating is 5 amps, 230 V d.c.

Larger "Ductubes" Available

READERS may remember in our issue of February 9 this year we described the "Ductube" method of fabricating ducts in concrete work. This method included the use of pneumatic tube formers known as "Ductubes," and is marketed in the British Isles by WIGGINS SANKEY LTD., Lysia Street, Fulham S.W.6. The tube length, of specially constructed material, was inflated by ordinary tyre laid in site, the concrete material poured and left to set. The tube is then deflated and, due to its construction, frees itself from the material, leaving a clean uniform duct.

"Ductubes" are available in 1 in., 1½ in., 2 in. and 3 in. and now 3½ in. and 4 in. sizes. Recently they have become available in continuous runs of 60 ft lengths instead of numerous short sections as before. We understand this system is clear in all respects regarding I.E.E. regulations, providing the cables are protected at all outlet positions.

Errata

IN our last week's issue a note referring to the new lighting fitting by THORN ELECTRICAL INDUSTRIES LTD., 105 Judd Street, W.C.1, was headed "Four-footers for the Home." These fittings, however, incorporate four 2 ft 40 W lamps not, as we later referred to, 20 W lamps.

In our Nov. 23 issue our note about Creda 1950-51 range of fires stated that the Goodwood fire "flicker effect" could be used independently of the element and vice versa. In fact only the flicker effect can be used alone.

TRADE PUBLICATIONS

SWITCHES AND ACCESSORIES. Catalogue "H," latest issue by Arrow Electric Switches Ltd., Hanger Lane, Ealing, London, W.5, gives comprehensive details of all the rotary and tumbler switches, the switch units and other accessories manufactured by the company.

AIRCRAFT ELECTRICS. Rotax Ltd., of Willesden Junction, have issued many more sections for their service and overhaul manual. As those familiar with these publications will know, Rotax literature is renowned for the clarity of layout and the coloured cut-out projections which illustrated their apparatus.

WIRING SUPPLIES. Sloan Electrical Co. Ltd., 41 Kingsway, W.C.2 have now published a new Electrical Accessories and Wiring Supplies Catalogue, giving details of their "Off the Shelf" service.

The "Comet"—A New Cooker

AN oven of 3,600 cu. in. capacity, a large plate-warming drawer, three large boiling plates with simmerstat control, an attractive appearance, and the general convenience of a horizontal cooker are amongst the notable features of the Creda "Comet," details of which were released by Simplex Electric Ltd. last week.

The horizontal feature has been obtained with only 15 in. width extra to a standard cooker, the height and depth dimension remaining unchanged at 36 in. and 21 in. respectively. Oven dimensions are 15 in. high × 14½ in. wide × 16⅜ in., and the loading is 3,450 W. A drop-down door and automatic interior light are amongst the desirable features. The separate grill chamber is loaded at 1,500 W and has a grilling area of 9¾ in. × 7½ in., while the warming drawer is loaded at 400 W.

The hob is available in two types. For home service, three 8 in. 1,800 W plates are fitted, with EDA interchangeability. An export model is available where this feature is not required, which also accommodates a 6½ in. 1,000 W plate. All plates are simmerstat controlled, switches being accommodated in a convenient position accessible without bending, and pilot lights are provided for oven and warming drawer.

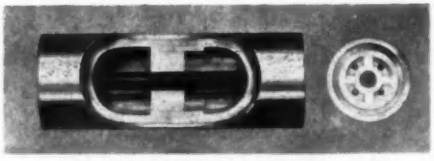
Finish is in cream enamel, and the cooker is supplied with legs or with a double storage cabinet in the base. Prices are: DH1 (3 plates and legs) 54 gns., DH2 (3 plates and cabinet) 60 gns., the corresponding 4-plate models (DH3 and DH4) being 56 and 62 gns. The "Comet" is expected to be available on the home market early in 1951.

The "Comet" DH2 with oven and cabinet doors open

New T/V Cable for Alexandra Palace

THE main antenna at Alexandra Palace has recently been overhauled and a new feeder installed using a type of coaxial cable recently introduced by the Telegraph Construction and Maintenance Co., Ltd. This cable, known as the A.S.84.A.1, has, it is claimed, probably the highest power rating of any v.h.f. cable yet made, two in parallel carrying up to 20 kW (peak white) at 45 Mc/s in the present installation.

The inner conductor is a solid copper wire of rather more than a quarter-inch diameter. The insulation is formed by the assembly of a series of interlocking semi-cylindrical thimbles which are accurately moulded in Telcothene of low dielectric loss. These form a smooth cylindrical surface on the outside of the core and provide a robust support for the inner conductor.



The AS84AI coaxial cable

The outer conductor is formed by a seamless extruded tube of high conductivity aluminium, which is applied to the core by the Johnson and Phillips process. This aluminium tube provides a highly efficient return conductor and an effective screen at all radio frequencies, and at the same time serves as a watertight sheath to protect the semi-air-spaced insulation.

Its robustness and light weight permit it to be installed up masts without the usual steel wire armour. Recently a 500-ft length of similar cable was successfully pulled directly up one of the B.B.C.'s guyed masts. The normal corrosion-protective servings, comprising bitumenised papers and hessians, are used.

The degree of electrical uniformity of propagation characteristics, so important for broad-band transmission such as television, is remarkably good. Tests by the B.B.C. on a 280-yard length of this cable indicated that with a correctly terminated load, the voltage standing-wave ratio would not be worse than 0·98 over a 10 Mc/s band centred on 60 Mc/s.

THE WEEK

INDUSTRY *in news* COMMERCE

Compensation to Municipalities

UNDER the provisions of the Electricity Act, the Ministry of Fuel and Power allocated a sum of £5 million to be distributed among local authorities in compensation for the severance of their electricity undertakings. Details have been released of amounts received by some of the larger local authorities in Lancashire, Cheshire and North Wales. As may be expected, Liverpool easily heads the latest list of 21 localities with £162,764, Preston receives the second largest share of £41,715 and Birkenhead and Blackpool follow with compensatory sums of £35,871 and £30,224. The lowest figure is accorded to Mold which receives £1,143.

U.K. Synthetic Rubber?

SPEAKING at the Institution of the Rubber Industry's dinner in London last Friday, Mr. G. E. Beharrell, managing director of the Dunlop Rubber Co., suggested a closer examination of the need for a United Kingdom synthetic rubber industry. A synthetic industry could best be set up, he said, by chemical engineers. The worsening of the international situation and the urge for stockpiling, particularly in the U.S., had altered the statistical, commercial and technical problems of the industry.

Mr. Beharrell said that 1950 had seen a revival of the great U.S. synthetic rubber industry, while stockpiling requirements had added to high world consumption and forced prices of rubber up to unprecedented levels. When American stockpiling was completed, he asserted, it was difficult to visualise a return of the industry to heights contemplated only a year ago. In the face of that competition, both technical and marketing research should be continued at the highest possible level with full regard to the needs of the rubber manufacturer and consumer, Mr. Beharrell concluded.

Census of Production

THE Board of Trade has published an Order, to come into force on December 30, relating to the scope of next year's Census of Production covering traders in business during 1950. The census has been taken at intervals since 1907 and annually for the past three years. The Order has the lengthy title of "The Census of Production, 1951 (Scope, Returns and Exempted Persons) Order, 1950" and can be obtained from H.M.S.O. or alternatively by placing an order with any bookseller.

Included in its contents are references to certain undertakings exempted from making the returns, and among these are producers of coal, gas and electricity who normally supply the necessary information to the Minister of Fuel and Power. Firms engaged in building and civil engineering contracting are also excluded. At the same time the B.o.T. has announced the names of the statutory advisory committee which is to advise them on the preparation of forms and instructions for the 1952 census.

Power Cuts in London?

ENGINEERS of the London Electricity Board are preparing a scheme whereby certain areas of Central London are likely to be blacked out for periods of half an hour. If the present voluntary system fails to reduce the load below danger point during peak hours, the plans now being laid will be brought into operation. Enforcement of the scheme may not be necessary, but should it be enacted, offices, banks and shops will be liable to cuts on specified days each week.

Employment in Electrical Industry

AMONG the numerous pages of the B.E.A.'s annual report was a section devoted to personnel, and in extracts from the volume in the ELECTRICAL TIMES last week we noted the fact that 170,500 were employed by B.E.A. at the close of the second period of nationalisation. Appropriately, the latest issue of the *Ministry of Labour Gazette*, just published, gives a detailed summary of men and women employed and unemployed in Great Britain at the end of September, which seems to complete the picture of those engaged in the electrical industry. The long list of tables relate to employees only, and exclude employers and those working on their own account.

The First Half-Century

Peter Willans set to work to find out what a steam engine really *did*, while his predecessors were busy with the theory of what it *ought* to do. Not till 1891 did we get the Willans straight line diagram, and then not directly in his own papers, but in a discussion on Crompton's paper on the Generation of Distribution of Electrical Energy. That Diagram created a great stir; all the professors said they knew it before, but if so they failed to draw the correct inference that the full load was the most economical load for an engine. *From our issue of December* 13, 1900.

Comparative figures of employment in the industry show little change between mid-1948 and September, 1950. Most notable increase is in the manufacture of wireless apparatus and gramophones, where numbers have jumped from 67,200 to 82,500. Under the heading of Electricity, figures reveal a considerable increase of 22,000 from a total of 140,200 in 1948. The only decrease of note is a drop of nearly 4,000 in the wires and cables section. The analysis of the industry is shown as follows:—

Industry	*Total (thousands)* Mid-1948	1950
Electrical machinery	164·9	164·8
Electric wires and cables ...	62·2	58·6
Telegraph and telephone apparatus...	44·4	44·3
Wireless apparatus and gramophones	67·2	82·5
Wireless valves and lamps ...	36·6	35·8
Batteries and accumulators ...	19·3	20·6
Other electrical goods ...	119·5	123·2
Electric wiring and contracting	67·7	70·7

Turning to unemployment we note that comparative figures are not given. Only in one section, however, does the number top the thousand, namely 1,059 under "Other electrical goods," while those who have not found jobs in the manufacture of batteries and accumulators amount to only 177 of which over 100 are women.

Labour turnover also provides a deal of interest, figures covering the four-week period ending August 26, 1950. Those engaged (per 100 employed at the beginning of the period) in all sections of the industry number 26·3, which compares favourably with the 18·5 discharged.

Contracting on the Doorstep

AS a diversion from installing street lighting for various concerns in all parts of the country, Metrovick have recently erected columns and lanterns outside their own Trafford Park works. "Trafford" lanterns, using the mercury discharge lamp horizontally, have been erected on one side of each of two carriageways along the Westinghouse Road. Incidentally, the road itself is of interest in that it was named after the founder of the company under its original name of British Westinghouse Electric and Manufacturing Co. The new lighting will undoubtedly improve conditions for the 200 buses which carry over 10,000 workers to their homes at five o'clock each evening.

Street-lighting installation by Metrovick outside the company's own Trafford Park works

Sir Harold Webbe, member of the Board of Hoover Ltd., congratulating Peter Hedgecock at the firm's Perivale school's annual prizegiving

Apprentice wins Scholarship

AT the annual prizegiving of Hoover's school for apprentices at Perivale, Sir Harold Webbe made a token presentation to 19-year-old Peter Hedgecock, who gained a state scholarship to the Imperial College, London University, where he will specialise in metallurgy. The function was also notable for an exhibition of engineering and handicrafts staged by the trainees, and Sir Harold addressed the apprentices and their parents on "Some Reflections on Education." The school has several training schemes, including pre-apprentice courses for boys of 15½ who do four months' work in the training department's workshops. At 16, the boys may enter an annual open examination for apprenticeship in competition with boys from secondary schools.

S.E. Board stops Advertising

MUCH publicity has already been given to the Minister of Fuel and Power's statement on the urgent need for economy this winter in the use of electricity, gas, coal and coke. Following a letter from the chairman of the S.E. Electricity Board,

The new 132 kV transmission line now in the course of construction along the Lea Valley from the Brunswick Wharf power station, Poplar, to Brimsdown sub-station, is considered to follow one of the most difficult routes yet encountered by the B.E.A. Our illustration shows a D2° tower, built by Tees Side Bridge and Engineering Works, lying on the test bed. The conductors are .4 sq in. copper equivalent s.c.a. with a maximum working load per conductor of 12,000 lbs. Main contractors are J. L. Eve Construction Co. Ltd., who completed tower designs to the approval of the B.E.A.

the chairman of the Area's Consultative Council, Mr. M. A. Bullock, impressed on the Council's members the gravity of the situation at their meeting last Thursday, and asked them in their contacts with consumers to stress economy.

After the meeting, Mr. Bullock told the ELECTRICAL TIMES that while present circumstances prevailed, the S.E. Board were to discontinue all their promotional publicity campaigns. This decision will no doubt find support among consumers and their representatives who have been unable to understand why electrical apparatus has been advertised while the acute shortage of electricity exists. This latest action by the Board was anticipated at a meeting last month, when it was decided to suspend the simple hire of new apparatus. As an additional economy showrooms will not remain lighted after closing time.

Among matters discussed at the Council's meeting was the proposition that there should be an annual conference of Consultative Councils. As the recognised links between consumers and the "high-ups," it was stated, the annual meetings would provide excellent opportunities to pool ideas. The suggestion was not supported, and one member who said the time was not ripe at present, criticised other Councils in the country which, he said, were far behind the S.E. Area. He quoted one instance where the main object was apparently "to throw spanners in the Board's works." A further suggestion that Consultative Councils should have better representation at the Power Conference was well received, and the chairman is to carry a resolution to the Board, requesting that seven members of the Council be invited to the conference.

Raw Materials and the E.I.A.

MEMBERS of the South London group of the Engineering Industries Association, at their luncheon on Wednesday last week, heard Mr. A. H. Kirk (vice-chairman, London and South East Section of the National Industrial Salvage and Recovery Advisory Council) speak on "Finding Materials in Short Supply," in which he pointed out that N.I.S.R.A.C.'s *Salvage Recovery Bulletin* was probably the best method and, in some cases, practically the only hope of the smaller manufacturer, and spoke of the work done by the Advisory Council in conserving surplus material and converting it to useful purposes.

Main address was given by Capt. C. A. Kershaw, R.N. (retd.), who spoke on "The E.I.A.,its Achievements and Ambitions." Pointing out that the membership was at present over 2,800 firms, Capt. Kershaw, the secretary-general of the Association, felt that this was still not enough. Solidarity of membership amongst the smaller firms was essential if they were to be adequately represented at the highest levels where Parliamentary and Ministry matters were concerned, and the other advantages which could accrue from such solidarity were of great importance to them.

The next meeting of the South London Section will take place on March 7 next.

Relaxation Methods

RELAXATION methods of solving field problems have become established as a powerful tool in electrical engineering mathematics. An opportunity to study the technique involved in their application is afforded by a course of lectures to be held at West Ham Municipal College, on Thursday evenings in the New Year. The lecturer will be Mr. G. F. Freeman, M.SC.(ENG.), M.I.E.E., A.M.I.Mech.E., and he is to deliver six lectures suitable for degree standard students. Each lecture will last from 6 to 8.30 p.m., and will be illustrated by examples in which those attending will be expected to participate. The fee for the course is £1.

It all Depends on Electricity

THE need for an adequate supply of electricity where and when it was required was emphasised by Col. B. H. Leeson, vice-president of the I.E.E., when he addressed members of the North-Eastern section at their annual dinner recently. He said the power industry was starved of the capital it needed for development. Those present should use

The new counter display for the latest Creda kettle, which is being distributed to the dealers both at home and abroad by the makers, Simplex Electric Co. Ltd.

their influence to get the industry back to where it was years ago when electricity was supplied to consumers as and when they wanted it. Col. Leeson continued by saying that Britain could not maintain its standard of living, let alone return to prosperity, nor carry out its defence policy, until it had an adequate supply of electricity.

Promotion

NEW opportunities are being offered by the B.E.A. to manual workers who want to progress in the electrical industry. It is now possible for a man who starts as a manual worker in a power station to become an engineer and enjoy the prospects of rising to even higher posts. An example of such a possibility has reached us this week from the N.W. Division of B.E.A. where employees who have applied for consideration for appointments as junior engineers have been intervieved.

We understand that the results have been encouraging and that four of the applicants attained the required standard, one of whom, Mr. H. Berry, a Blackburn electrician, has already been appointed as a junior engineer at Accrington. The other three will be considered for each relevant vacancy which occurs in the future.

Western Plant Engineers' Dinner

AMONG guests at the annual dinner of the Western Centre Branch of the Institution of Plant Engineers were senior officers of the majority of electrical and mechanical institutions, including the I.E.E., and Institute of Fuel. The function was notable for the elevated level of speeches made by those in the forefront of authority today. Numbered among the speakers was Mr. A. Irens, chairman of the Utilisation Section of the I.E.E. and chief electrical engineer of the Bristol Aeroplane Co. Ltd., who referred to the plant engineer's work as one of the most interesting in the engineering field.

The I.E.E., he said, was paying a great deal of attention to the whole subject of utilisation and electrification as an aid to productivity. In fact, the efficiency of utilisation was probably one of the key matters being discussed at present.

Refrigeration Prizes

BRITISH Refrigeration Association prizes were presented by Mr. E. G. Batt, director of B.R.A., at the annual prizegiving of the Stow College School of Engineering, recently. The College's programme of refrigeration trade training has always had the full support of the Association and the refrigeration industry. Latest development at the College is the completion of a fully equipped workshop to facilitate training in practical and theoretical work.

Electrify this Railway!

THE electrification of the railway line from Glasgow Central Station to East Kilbride, which has been under consideration for about 30 years, is the subject of representations to be made by the East Kilbride Development Corporation to British Railways and Transport Commission. The Corporation claims that electrification would increase the traffic on the line and eventually modify the congestion of road traffic in Glasgow which is considered to be excessive. It is also claimed that the scheme would prove economic to people living in areas served by the line, particularly East Kilbride where the population is estimated to increase in the next 15 years to about 40,000.

Housekeeping in Factories

THE Royal Society for the Prevention of Accidents is organising a national Good Housekeeping week for British industry from April 2 to 7 next year. Objects are to enlist support in securing

"Even a child could do it." This young visitor at the North Western Electricity Board's Exhibition, held at Macclesfield, gives an unrehearsed demonstration of the Hotpoint table ironer

The British Thomson-Houston Co.'s stand at the Smithfield Show, Earls Court, on which was exhibited all kinds of electrical equipment for power and lighting on the farm

tidiness and cleanliness in the workshop and to provide an opportunity for spring-cleaning of factories in readiness for the Festival. This, they claim, would help to reduce accidents, increase productivity, eliminate waste, and assist in salvaging scrap material.

Consultative Council's Secretary

WISHING to appoint its own secretary—it has the power under the Act to do so—the South Western Electricity Consultative Council has recently had discussions on the matter with Mr. Steward, chairman of the S.W.E.B., and Mr. A. Robens, Parliamentary Secretary to Ministry of Fuel and Power. It has so far been the usual practice to utilise a member of the staff of the Board for the duty, but this council feels that the secretary should be independent.

NEWS IN BRIEF

The London Electricity Board is negotiating with Hammersmith Borough Council with a view to the purchase of the freehold of the premises at Nos. 148, 150 and 152 Uxbridge Road.

British Insulated Callender's Cables' Kemble Players are presenting a Christmas pantomime *Jack and the Dragon* in the Warrington Road canteen, Prescot, next Tuesday evening (December 19). Tickets are obtainable from K. R. Mackley at 24 Dale Street, Liverpool 2, and proceeds are in aid of the E.E.B.A.

Seventeen thousand workers in the eight Birmingham factories of the Joseph Lucas Organisation have been invited to name the 12 Christmas carols they consider to be most popular. The worker whose list tallies with one already drawn up by a works committee will receive a Christmas tree laden with gifts. To give competitors some assistance carols are being broadcast through the factories during the firm's morning tea break.

Dr. B. E. Noltingk, of Mullard's Electronic Research Laboratories, spoke on "Ultrasonic Generators for High Powers" at a recent meeting of the British Institution of Radio Engineers. A variety of ultrasonic apparatus was exhibited at the meeting.

A consignment of (approx.) 7,000 complete electric shavers recently left the Hillington factory, Glasgow, of Remington Rand Ltd. for shipment to Australia, Canada and Sweden.

A. E. Walsh and Partners Ltd. have recently issued a brochure consisting of twenty questions relating to industrial management. The questions survey many aspects of management aimed at assisting the manufacturer with production problems. The above firm has now moved to larger premises at 92 New Cavendish Street, Portland Place, W.1.

Questions in Parliament

N. Scotland Output

Replying to a question by Mr. Grimond, the Secretary of State for Scotland said the North of Scotland Hydro-Electric Board expected to generate about 444,000 kW towards the end of 1951. Of that total 324,000 kW would be from water power, 90,000 kW from steam and 30,000 kW from diesel engines. A further query as to what proportion would be retained in the North of Scotland, and what amount exported, he considered it risky to answer, for there was controversy going on amongst experts on the subject, in which he had no intention of interfering if he could avoid it.

Scottish Electricity

Protesting at "the grave and increasing dislocation of trade and industry throughout Scotland arising from the frequent and unprecedented cuts in electricity supply, with consequent danger to life and limb of those employed," a group of Scottish Conservative and Liberal M.P.s have tabled a motion calling for the immediate setting up of an All-Scotland Electricity Board.

In opposition, Scottish Socialists have put forward a motion stating "that this House congratulates the Government on the success of its policy of full employment in Scotland and on the number of houses and factories built with State assistance, and, while it has not been possible for the constructors of new generating stations required to keep pace with the increased demand for electric power, urges the Government to ask industry to adjust further its use of power in order to avoid any curtailment of employment or cuts on domestic consumers during vital hours."

Revised Regulations

Consideration is being given to a revision of the Electricity Supply Regulations, 1947, and the

Overhead Line Regulations, 1947, and it was hoped in due course to lay revised codes before Parliament, Mr. Noel-Baker stated in reply to a question as to what regulations had been made under Section 60 of the Electricity Act, 1947, to prevent personal injury. The Minister pointed out that both of those Regulations, which were still in force, contained numerous provisions for preventing personal injury.

Coal Stocks

Replying to a question on coal stocks held by the B.E.A., the Minister of Fuel and Power said that at May 1, 1950, such stocks amounted to 2,827,200 tons, as against 3,084,700 tons at May 1, 1949. On November 24 last they were 3,851,800 tons; and on the same date last year, 4,295,300 tons. Deliveries in the four weeks ended November 24 last, were 2,548,900 tons, and in the corresponding period last year, 2,418,600 tons. Consumption during the same four weeks was 2,830,900 tons in 1950 and 2,570,700 in 1949.

Power Cuts

The questions of loss of production, damage and potential danger caused by power cuts in Scotland were raised by three members, and it was suggested that a meeting of the appropriate bodies should be called to discuss some method of giving warning. The Minister of Fuel and Power, referred to an earlier reply in which he stated that the Electricity Sub-Committee of the Joint Consultative Council was in consultation with the B.E A. on the matter. But in regard to Scotland specifically, he thought the Scottish Board for Industry would be an appropriate body to call a conference, if that would serve a useful purpose.

Restrict Shop and Street Lighting?

In view of the threatening fuel crisis, the Minister of Fuel and Power was asked if he would prohibit shop window lighting, floodlighting and similar non-essential use of power after hours. He replied that all ways of conserving coal supplies were being examined; shop window and advertisement lighting was already restricted. Later there were two or three suggestions to limit street lighting, and Mr. Barnes said such economies to save fuel were being considered.

Metal Scarcity

In a written reply concerning the metal position, Mr. G. R. Strauss said that if shortages of non-ferrous metals of the kind with which we were now threatened continued throughout 1951, a check would be imposed upon the rising output of engineering industries, thus affecting not only the rearmament programme but also the export trade and essential investment at home. The Government had decided to take further steps to ensure the proper distribution in the national interest of those metals where a severe shortage persisted. The measures under consideration, in consultation with industry, included restrictions on the export of semi-manufactures, the prohibition of the end uses of these metals for inessential articles, and the institution of allocation systems. Meanwhile the supply prospects for the metals which are at present causing most concern were:

Zinc: Supplies of all grades will involve further cuts in consumption. During the first quarter of the year the position was likely to be even more serious owing to a particularly acute shortage of the ordinary grade used mainly for galvanising and for making brass and zinc oxide. Supplies of this may have to be restricted during that quarter to little more than 50% of the rate of consumption during the first nine months of 1950.

Copper: A severe shortage of certain special shapes would affect particular fabricators unless they were in a position to substitute the normal shapes in their processes. For the rest the prospects for copper in the early months of 1951 were that supplies would not allow of consumption at a higher rate than in the first half of 1950, representing a cut of about 10% on the current rate of consumption and an even greater cut on normal civilian consumption as the requirements for defence progressively increase.

Aluminium: Supplies of virgin aluminium, which have been running at about 17,000 tons a month, would have to be restricted in 1951 to 15,000 tons a month.

Nickel: No prospects of an increase in supplies.

Steel: There was at present no real shortage of general steel, but steel production in 1951 may be affected by difficulties in supplies of raw materials, particularly imported scrap and iron ore. If those difficulties could not be overcome, the 1950 level of steel output may not be achieved in 1951. No improvement in supplies of steel sheet or tinplate could be expected until the new plant in South Wales comes into production in the later part of 1951.

House Heating

When asked if authorisation had been given for heating houses by electricity with cables inserted under the floor, and whether the method was satisfactory, Mr. Bevan's reply was: "No", so far as local authorities were concerned. He had no information about the system in privately built houses.

Power Station Efficiency

In spite of the large amount of old plant still in use, the average efficiency of the steam power stations of the B.E.A. in the twelve months ended June 30, 1950, was 21·41%. The corresponding figure in the twelve months which preceded vesting was 20·8%. The present programme of new plant up to and including 1954 provided for 7,000 MW of additional power. This plant will have a higher efficiency and some stations, it is hoped, will reach an efficiency of 29%. This information was given by Mr. Noel-Baker in reply to a request by Mr. Murray for details of technical improvements made by the B.E.A. and the efficiency of generation achieved.

Electric Supply News

Agecroft

It is hoped that the first of the 50 MW turbo-alternators will be put into operation within the next few days.

Connah's Quay

In preparation for the erection of a new power station, three-quarters of a million tons of sand have been pumped out of the Dee estuary—with the help of Dutch engineers experienced in land reclamation—and the river's south bank has been raised eight feet at that point. It is understood that the B.E.A. has acquired 130 acres of land (in addition to the 70 to be occupied by the buildings) for the disposal of ash, and it is considered that in 20 years' time this disposal will reclaim this land from flooding by the Dee.

Eire

The flat rate for lighting of shops, factories, public institutions and similar premises, applying throughout the Free State, now at 8½d. p.u. is to be reduced to 7d. For the time being at any rate, there will be no reduction to domestic consumers.

In the Dail, recently, the Minister for Industry and Commerce was asked whether, in view of the fact that the E.S.B. estimated in January, 1948, that capital expenditure on rural electrification by 1952 would amount to £8,000,000, increased subsequently by 10% because of higher costs, and that the expenditure actual and estimated to April, 1951, was £3,433,000, or about 40% of the original programme, he would state the reasons for the Board's failure to realise its estimated rate of development.

Mr. Cosgrave explained that the principal reason the Board had not been able to achieve the estimated rate of development had been the shortage of skilled engineers and the difficulty in obtaining the large quantities of materals required.

Inverary

The Town Council has written to the local area manager of the North of Scotland Hydro-Electric Board expressing dissatisfaction at the delay in bringing electricity to the town. It is understood that the Council came to an arrangement with the Board some four months ago to have electricity brought to Inverary, but they had had no further news of the matter. The burgh is close to Glen Shira, where one of the largest constructional schemes of the Board is in progress, but the scheme is not expected to be ready for some time.

North of Scotland

The new loch formed by the Pitlochry dam of the Tummel-Garry hydro-electric scheme has been named Loch Faskally. The North of Scotland Hydro-Electric Board, after consulting Pitlochry Town Council, selected this name as the most appropriate. Loch Faskally stretches for about three miles from Pitlochry to the junction of the rivers Garry and Tummel.

Poole

In the process of stocking up coal for the new Poole power station, the first cargo of coal arrived at the station in the *Poole Harbour* recently. It has been stated that the first machine may be operating by the end of the year.

Scotland

Criticism of the recent power cuts in Scotland was made when the matter was discussed by both the Glasgow and Edinburgh Corporations last week. At Edinburgh, a motion "that this Corporation, in view of the present unsatisfactory conditions appertaining to the generation and distribution of electricity in Edinburgh, recommends to the Government, through the Secretary of State for Scotland, that the generation and distribution of electricity should be entrusted to a board or boards within the limits of Scotland itself" was carried by 33 votes to 12. The same day the Glasgow City Council agreed to appoint a special committee to assist the electricity authorities in dealing with the situation.

South Western

For the record it can be stated that the South Western Electricity Board is actively discouraging the sale and use of electric fires. Arising out of Mr. Steward's press conference last week it seems that some sections of the lay press reported that the Board had banned the sale of electric fires, which is not strictly correct.

Thornhill

Consent for the extension of the Thornhill power station, near Dewsbury, has been received from the Ministry of Fuel and Power, by the B.E.A. The authorisation covers the installation of one 45,000 kW turbo-alternator set and one 180 klb/hr. boiler, together with the construction of a cooling tower.

LIGHTING SCHEMES

Arbroath.—The T.C. has approved plans for the conversion of all the town's street lighting to electricity.

Clacton.—The Corporation propose to illuminate the whole length of the seafront as a contribution to the Festival of Britain.

Coventry.—The City Engineer's Department is taking over control of street lighting from the West Midlands Gas Board and the East Midlands Electricity Board.

Edinburgh.—The T.C. has authorised the city lighting engineer and manager to carry out an experiment in fluorescent lighting in a prominent street.

Morpeth.—The T.C. has postponed until next March consideration of a scheme for installing electric lighting.

Rowley Regis.—A scheme for fluorescent lighting in Blackheath High Street is to be submitted to the Ministry.

Stamford.—The T.C. is to install electric lighting on a portion of the Great North Road.

Company Activities

British Aluminium Co.

The offer to ordinary shareholders of 2,000,000 new £1 ordinary shares at 34s., in the proportion of two for three held, resulted in an acceptance of over 90%. As a result, applications for excess shares were heavily scaled down. Allotment letters were posted last week-end.

Crabtree Electrical Industries

Having difficulty in obtaining sufficient labour, large sums had been spent on providing new mechanised foundry equipment and also on the development of improved production methods, Dr. H. Schofield, chairman, stated at this meeting last week. He also drew attention to the bonus paid this year to employees, as it was felt desirable to recognise that the increased prosperity of the company was due in no small measure to the enthusiasm and energy displayed by them. This is the fourteenth year the company has paid a dividend of 17½%. The cash position is strong and adequate stocks of materials are available, but Dr. Schofield is not too happy about the future in general.

Dewhurst and Partner

For the year to September 30 last, profit on trading, etc., was £86,806, an increase of £9,734 over the previous year's figure. Emoluments, depreciation charges, etc., absorb £10,068, and taxation £40,000 (*£35,000*). There is a final dividend of 25% (*20%*) making 35% for the year, as compared with 30% the previous year, and the carry forward is £27,188 higher at £148,170.

Electrical Components Ltd.

It is proposed to increase the capital by the creation of 100,000 5½% cumulative redeemable preference £1 shares, and to make an issue of 47,500 of these at 21s. each.

General Cable Manufacturing Co.

Trading profit, etc., for the year to September 30 last, at £102,504 was £4,142 above the corresponding figure for the previous year. After charging depreciation, etc., the profit was £91,274, to which is added £4,785 from deferred repairs provision not now required. The sum of £50,295 (*£45,500*) is absorbed by taxation, and £15,000 (*same*) is placed to general reserve. Dividends, including final Ordinary 18%, absorb £23,100, leaving £23,911 (*£16,247*) carried forward.

Marco Refrigerators Ltd.

An explanation of the unexpected drop in profits is given in the full report. It seems that the export demand was greater than had been anticipated and, in switching supplies to overseas markets, the company had perforce to accept a temporary dislocation of output; as a result, although exports rose by 54%, total turnover was down by 6%, the chairman states. The balance between home and export trade has been restored and turnover is now about 50% above the previous highest for this time of the year. Consolidated trading profit for the year to September 30, was £40,200 (*£74,830*). After allowing for depreciation, taxation, and dividends, including final ordinary 10% (*17½%*), there is £56,718 (*£55,085*) carried forward.

Morphy-Richards Ltd.

Consolidated trading profit for the year to June 30 last amounted to £151,912, an increase of £26,160 above the previous year's figures. The sum of £15,000 (*nil*) has been provided against liabilities which cannot be accurately assessed at the moment. There is also credited dividends from subsidiaries in respect of previous periods totalling £3,782, and net "adjustment" £6,015. After charging £59,487 (*£58,005*) for taxation, and allowing for minority holders' interests, etc., the profit of Morphy-Richards is £24,724 (*£35,266*). The ordinary dividends totalling 40% on £110,000 capital, as against 160% on £27,500 in the previous year. The group carry forward is £29,168 (*£27,500*).

Perak River Hydro Electric P. Co.

The sum of £40,000 has been allocated to create a fuel equalisation reserve which is to be available in years of low river flow when heavy fuel charges must be met, the chairman, Mr. W. Shearer, pointed out at this meeting. In this respect, the year to July 31 last was favourable, the Chenderoh hydro-electric station generating 224 million units—38% above the previous year, and a record for the station. More generating plant will be needed by 1952, but a bulk supply from the Malayan Grid is unlikely by that date The only alternative to meet the short-term position would seem to be to arrange for the installation of diesel plant, he said.

Plessey Co.

For the year to June 30, consolidated trading profit, plus investment income and less written off investments, totals £255,573, as against £263,975 in the preceding year. The sum of £100,000 is transferred to reserve for enhanced cost of replacement of fixed assets, and £6,606 is placed to depreciation, leaving a balance of £148,967 (*£158,163*) to which is added £26,833 being adjustment of profits of previous years, making a total of £175,800 (*£190,823*). After allowing £117,786 (*£106,629*) for taxation, the net profit is £58,014 (*£84,194*), of which £56,874 relates to the parent company. Preference dividends absorb £25,135, and the ordinary 20% for the year £27,500 (*same*), leaving £119,042 (*£114,803*) carried forward.

Dividends Declared

Johnson Matthey—Interim of 3% (*same*).
Solus Teoranta—Interim of 5% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

Dec. 15.—Harrow U.D.C. Installation of lanterns and 140 W sodium vapour lighting along a total of 5¼ miles. Also 3/80 W fluorescent lighting at various shopping centres. Council's Engineer and Surveyor, H. W. Rackham, Council Offices, Uxbridge Rd., Stanmore. Deposit £2 2s.

Dec. 16. — Ince-in-Makerfield U.D.C. Electrical installation in 34 bungalows on Petticoat Lane site. Surveyor is R. Lewis. Deposit £1 1s.

Dec. 18.—Belfast. Electrical installation in Community Centre at Finaghy. Northern Ireland Housing Trust, 12 Hope St., Belfast. Deposit 10s.

Dec. 18.—Dewsbury T.C. Electrical installation in Flatts nursery school. Borough Architect and Building Surveyor, Town Hall.

Dec. 18.—Durham. Electrical installation in proposed hostel at Billingham. Applications by the above date to the County Architect, Court Lane, Durham.

Dec. 18.—Lees U.D.C. Supply and erection of 18 reinforced concrete columns and lanterns and 140 W sodium discharge lamps for section of High Street; also for 21 columns, lanterns, and lamps for part of Huddersfield Rd. Council Offices, Cross St., Lees. Deposit £2 2s.

Dec. 18.—Pudsey T.C. Electrical work in erection of 42 houses on Southroyd Park site. Borough Surveyor, Town Hall. Deposit £2 2s.

Dec. 20.—Adlington U.D.C. Supply, erection and wiring of precast lighting columns and brackets, supply and installation of lanterns, lamps and auxiliary equipment, along one mile of trunk road. Council's Surveyor, Robt. Hilton, Council Office, Market Place.

Dec. 20.—Hawick T.C. Electrical installation in erection of 3 houses at 21 Loan. Burgh Surveyor, Municipal Buildings.

Dec. 20.—Luton T.C. Installation of electrical services, wiring and equipment in 73 houses on Farley Hill estate. Borough Engineer, Town Hall. Deposit £2 2s.

Dec. 20.—Tyrone. Electrical installation at Omagh model primary school for E.C. A. Gibson, Chief Education Officer, Education Offices, Omagh.

Dec. 23.—Wicklow. Installation of electric wiring for lighting and heating at Court House, Baltinglass. K. J. Brangan, County Secretary, County Council Offices, Court House, Wicklow.

Dec. 28.—Winchester. Supply and erection of two diesel engines (each 100 h.p.) and a variable speed electric motor (100 h.p.) for driving 3 existing pump sets. City Engineer, Guildhall. (See Nov. 30.)

Dec. 30.—Haslemere U.D.C. Supply and erection of electric motor of approximately 60 b.h.p to drive multi-stage centrifugal pump, with starting and automatic gear. Engineer and Surveyor to the Council, Council Offices, Museum Hill. (See Nov. 30 issue.)

Jan. 1.—Chester. Renewal of electrical installation in Town Hall. Consulting Engineers are Sloan and Lloyd Barnes, 34 Castle St., Liverpool 2. (See Dec. 7 issue.)

Jan. 3.—Wandsworth. Supply of electric lamps and electrical works for periods up to April 1, 1951. R. H. Jerman, Town Clerk, Municipal Buildings, S.W.18.

Jan. 5. — Belfast. Electricity dept. require supplies of materials, including static transformers, 6,600-V armour-clad switchgear, overhead line materials, copper covered and rubber insulated cables, street lighting fittings and ancillary equipment, cookers and lamps. Dept.'s address is East Bridge St., Belfast. (See Dec. 7 issue.)

Jan. 6.—Dagenham. Electric lamps are included in a list of supplies required by the Council during the year beginning April 1, 1951. Applications should be made to Borough Engineer and Surveyor.

Jan. 6.—Walsall. Supply of electrical equipment for Footherley Hall residential nursery. L. J. Joseph, Children Officer, Children Dept., 29 Leicester St., Walsall.

Jan. 8. — Billingham U.D.C. Street lighting works as part of Roseberry Rd. development scheme. Eric G. Lediard, Chartered Civil Engineer, 4 Eldon Square, Newcastle-on-Tyne 1. Deposit £5 5s.

Jan. 8.—Durham. Electrical installation in proposed hostel at Winlaton. Applications by the above date to the County Architect, Court Lane, Durham.

Jan. 8.—Hastings T.C. Electrical installation in 116 houses at Hollington. Borough Engineer, 37 Wellington Square, Hastings. Deposit £2 2s. (Advertised in this issue.)

Jan. 12.—Kidderminster. Installation of new radio equipment for (approx.) 90 beds at Kidderminster General Hospital. Hospital Administrative Officer, Mill St., Kidderminster. (See Nov. 23 issue.)

Jan. 19.—Belfast. Supply and erection of (*a*) CO_2 fire fighting equipment for protection of 6,600 V switchgear and (*b*) 33 kV and low voltage cables, for harbour power station. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne 1. Deposit on each is £5 5s. (Advertised in this issue.)

Jan. 24.—Metropolitan Water Board. Supply and delivery of a main l.t. switchboard at pumping station at Ashford Common, Middx. Board Offices at New River Head, Roseberry Ave., E.C.1. Deposit £1 1s. (Advertised in this issue.)

Jan. 31.—York. Installation of (*a*) mechanical services, and (*b*) electrical services in former military hospital at Fulford Hospital, Naburn, York, for Leeds Regional Hospital Board. Applications to Architect to Board, 29-31 Eastgate, Leeds 2, by Dec. 20. Deposit £2 2s. for each part.

Feb. 5.—Bridge of Allan. Supply and installation of 42 street lighting columns, wiring and fixing of lanterns with sodium lamps and gear, time switches, etc., in Henderson Street (A.9). John B. Craig, Burgh Surveyor's Office, Bridge of Allan. Deposit £2 2s.

No date stated.—Aberdeen. Electric lighting for proposed school house at Dyce for C.C. George Watt and Stewart, architects, 214 Union St.

No date stated.—Ennerdale (Cumberland) R.D.C. Supply and erection of 32 electric street lighting points at Smithfield, Egremont, and 30 points at Cragg Rd., Cleator Moor. Surveyor, Council Chambers, Cleator Moor.

No date stated.—Leven T.C. Electrical work in 16 houses in six blocks at Mountfleurie. Applications to A. D. Haxton and Watson, 5 Scoonie Place, Leven.

Contractors should note that closing date for tenders for wiring of Chester Town Hall is Jan. 1, and not Jan. 2 as stated in these columns last week.

OVERSEAS

Details of items marked • may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.

Jan. 6.—Canada. 63 a.c. distribution panel boards for 120/208 V, complete with all necessary component parts for Yonge Street Subway, Toronto. Toronto Transport Commission, 35 Yonge St. B.o.T. (Ref. CRE (IB) 71845/50).•

Jan. 31.—Wellington (N.Z.). Post and Telegraph Dept. requires one u.h.f. signal generator, frequency range 2,500 to 5,000 mc/s; and one v.h.f. field intensity measuring set, frequency range approx. 25 to 600 mc/s. Director-General (Stores Division), G.P.O., Wellington C.1.

Feb. 21.—Brisbane. State Electricity Commission invite tenders for two 66 kV circuit breakers for Maryborough substation, each equipped with current transformers multiple ratio 100/50/5 A. Also a 66 kV circuit breaker for Childers substation with 3 current transformers multiple ratio 50/25/5 A B.o.T. (Ref.: CRE (IB) 71615/50).•

April 3.—Wellington (N.Z.). Two tenders by State Hydro-Electric Dept. for supply and delivery of steel-cored aluminium transmission line conductor and accessories for Napier and Christchurch districts. Specifications available at N.Z. Govt. High Commissioner's Office, John Adam St., W.C.2.

CONTRACTS PLACED

Bournemouth T.C. Supply and installation of vehicle-actuated traffic signals at junction of Christchurch and Ashley Rds. The Siemens and General Electric Signal Co., Ltd., £1,213.

Coventry T.C. Electrical installation in Wyken Croft School, Electrical Installations Ltd., £4,002.

Cowes (I.o.W.) U.D.C. Installation of Class A street lighting from the Ferry to Crossways, Southern Electricity Board, £2,300.

Dagenham T.C. Electrical installation on Heath Park estate, Eastern Electricity Board, £1,149; Whalebone Lane Flats, Evans and Shea Ltd., Romford, £1,684.

Glasgow T.C. Rectifier substation plant for Merrylee Rd., substation, G.E.C., £26,915.

Hereford. Installation of electricity at Ross secondary school, Conroy and Owen Ltd., Cheltenham, £6,249.

Jarrow-on-Tyne T.C. Installation of 579 street lighting units on South Leam Lane estate, N.E. Electricity Board, £2,034.

Manchester. Electrical installation at Roby St. premises of Regional Hospital Board, Casson Electric Co., Ltd., £1,068. Also installation of electric lift at Springfield Hospital, W. Lionel Gray (1933) Ltd., Farnworth, £4,280.

Northumberland. Electrical installation at Blyth South Farm county modern school, B. French, Ltd., of Easington, £6,041.

Peterborough. Electrical installation in 104 houses on Eastfield estate, M. F. Hansen, £3,350.

Shoreditch. Supply and fitting of 400 lanterns including swan neck brackets, Revo Electric Co., Ltd. Estimated cost £1,600.

TRADE NOTES

Canadian Office.—The Hackbridge and Hewittic Electric Co., Ltd., have opened new offices and plant at 103 Elmslie Street, Ville LaSalle, Montreal 32.

Holidays.—E. K. Cole, Ltd., will be closed from 5 p.m. Dec. 22 to 8 a.m. Dec. 27.

Venner Time Switches, Ltd., Kingston By-Pass Rd., New Malden, Surrey, will be unable to accept goods after 5.30 p.m. on Dec. 21 until 8 a.m. on

(*continued on next page*)

Your Queries — Answered

"Ewto" gloves, makers of? T.S.—Electrical Safeguards Ltd., 21 West St., Harrow-on-the-Hill. (19119)

"Alcosa" portable forges, makers of? B.C.—Wm. Allday and Co. Ltd., Alcosa Works, Stourport-on-Severn, Worcs. (19123)

Mushroom-shaped iron, makers of? E.B.—The nearest style that we can trace which is being made at the present time is a 3-in. long egg-shaped iron on a stand made by the Modenstal Electric Co. Ltd., 2/3 Oldham Terrace, High St., Acton, W.3. (19128)

"Lemcold" refrigerators, makers of? E.B.—Lema Electric Co., 49a Britannia Rd., S.W.6. (19136)

"Kopex" flexible metallic conduit, makers of? W.W.—Uni-Tube Ltd., 2 South Audley St., W.1. (19141)

"Butcher" earth leakage trip, makers of? E.B.—Electro-Methods Ltd., 220 The Vale, N.W.11. (19147)

"Sistoflex" insulation, makers of? U.D.—Spicers Ltd., 19 New Bridge St., E.C.4. (19152)

Heating units, 10 kW at less than 50 V, makers of? P.I.—A representative of the Electrothermal Eng. Co. Ltd., of 270 Neville Rd., London E.7, has stated that they should be able to assist. (19159)

The above are selected from questions we have answered this week. If you have a query, send it to us.

TRADE NOTES

(continued)

Jan. 1, 1951, due to the holidays and stocktaking.

Tok Switches.—The voluntary liquidation of Tok Switches Ltd., noted elsewhere on this page is purely a matter of convenience, we understand. Oliver Pell Control Ltd., who have for long manufactured the switches, and hold a controlling interest in the company, will now also market the switches.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£. s. d.	New York price
COPPER, electrolytic	202 0 0	£196 0 0
Delivered in 2nd and 3rd month after order ...	215 10 0	—
Delivered in 4th, 5th and 6th month after order	217 0 0	—
LEAD, good soft pig (foreign)	136 0 0	136 0 0
,, ,, ,, "English" quality	137 10 0	
Delivered in 2nd and 3rd month after order, plus	7 0 0	
TIN (99-99.75%) ... ... (Cash) ...	1020-1040	—
,, (3 months)	985-995	—
ALUMINIUM, commercial purity (del.)	120 0 0	—
ZINC	151 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0.104 in.)	45 10 0	—
Mild Steel Tape (0.04 in.)	26 0 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Ashtead Electric Cable Drums Ltd. Resolution for voluntary winding-up passed at meeting on Nov. 28. Mr. Harold L. Ratcliffe, of 171 Shaftesbury Ave., W.C.2, appointed liquidator.

Supreme Refrigeration Co. Ltd. Resolution for voluntary winding-up passed at a meeting on Dec. 1. Mr. A. Tyldesley Eaves, Chartered Accountant, of 47 Mosley St., Manchester 2, was appointed liquidator, to whom particulars should be sent by Jan. 30.

Electrical and Car Services (Luton) Ltd. Petition for winding-up presented on Dec. 1 and will be heard at the Court House, Stuart St., Luton, on Jan. 4.

Tok Switches Ltd., of Cambridge Row, Burrage Rd., S.E.18, have appointed Frederick Wadden Charles, 11 Ironmonger Lane, E.C.2, as liquidator.

Burts Electric and General Supplies Ltd. Meeting of members to be held at 1-6 Ely Place, E.C.1, on Jan. 15 at 10.30 a.m., to receive liquidator's report.

BANKRUPTCY ACTS

Receiving Orders

London. Jack Faust, trading as radio engineer at 408 Barking Rd., Plaistow, Essex. Date of order, Dec. 1.

Liverpool. Harold Ward, radio and electrical dealer at 107 Aigburth Rd., Liverpool 17. Date of order, Nov. 29.

Order on Application for Discharge

London. Harold J. A. Wade and Clara L. Wade, lately trading as C. and H. Wade and Co., Electrical engineers and contractors, at 68 Brixton Water Lane, Brixton, S.W.2. Discharge suspended for six weeks and that they be discharged as from Dec. 19, 1950.

Intended Dividends

London. Leslie Bloom, trading as electrical engineer at Palace Theatre, 256 Belsize Rd., Kilburn, N.W.6. Last day for receiving proofs is Dec. 20, and trustee is Wm. Foy Cresswell, Senior Official Receiver, Bankruptcy Buildings, Carey St., W.C.2.

First Meeting

Croydon. Ronald Victor Perry, electrical engineer, of 2a Bingham Corner, Croydon. First meeting at 3 Central Bldgs., Matthew Parker St., S.W.1, on Dec. 19 at 11.30 a.m. Public examination at County Court, Scarbrook Rd., Croydon, on Feb. 15 at 10.30 a.m.

Company Winding up

Medcalfe and Co., Ltd., 141-142 Great Saffron Hill, Holborn, London E.C., mechanical and electrical engineers.

First meeting of creditors was held on Dec. 4, when Mr. G. M. Haddon, Asst. Official Receiver, reported that winding-up order was made on Oct. 23. Statement of affairs disclosed unsecured liabilities amounting to £72,757 and in addition there were preferential claims of £10,630 and a debenture holder's claim, secured by a floating charge, for £9,697. Assets were estimated to produce £31,438.

The company was formed in August, 1915, with capital of £1,000, increased in February 1937, to £2,000, all of which was issued, to take over an existing business of mechanical and electrical engineers. In 1937, the company began to manufacture its own equipment and during the war years it manufactured catering equipment for the Government.

In January, 1949, the company took a lease of a factory in a Government Development Area in Co. Durham, but that factory did not produce any finished articles until December, 1949.

Accounts prepared showed that for the year ended Dec. 31, 1947, a net profit of £5,812 was made on a turnover of £70,134 and in the following year a further net profit of £8,400 was made on a turnover of £78,216. In 1949, on a turnover of £45,915 the company incurred a net loss of £44,050, and in the six months to July 4 last, a further net loss of £16,910 was suffered on a turnover of £24,214.

A resolution was passed for the appointment of Mr. J. W. Clement, 59 New Cavendish Street, W.1, as liquidator, with a committee of inspection.

TRADE MARKS

Melplas. 688,875. Class 9. Insulated cables. Melwood Thermoplastics, Ltd., Willoughby Rd., Harpenden.

Pacific. B689,272. Class 9. Gramophones, talking machines wireless sets, etc. Hilton Nixon, Ltd., 6 Holborn Viaduct, E.C.1.

Neogram. B690,156. Class 9. Electrically illuminated signs, signalling and communications apparatus, etc. P. C. Berend, "Garth House," Ham Common, Richmond.

The Centurion, with design. 691,066. Class 9. Electric vacuum cleaning apparatus and domestic electric floor polishers. Bylock Electric, Ltd., 109, South St., Ponders End, Middx.

Westar. 687,983. Class 10. Electric instruments and apparatus for aiding the deaf. Western Electric Co., Ltd., Liberty House, Regent St., W.1.

Hotpoint. B687,761. Class 11. Electrical appliances, etc. Hotpoint Electric Co., Ltd., Crown House, Aldwych, W.C.2.

BUSINESS PROSPECTS

HOME

Belfast. Northern Ireland Hospitals Authority proposes to erect a general hospital on the Newtownards Rd. Also erection of 156 houses and 24 flats on Flush Park estate. Housing Architect, 94 Chichester St.

Burnley T.C. Erection of junior school at Woodgrove Rd. Architects, Leach Rhodes and Walker, 15 Manchester New Rd., Middleton, Lancs.

Chesham U.D.C. Erection of 24 flats in three blocks in Victoria Rd. Powell, North and Sanders, Norfolk House, Station Rd.

Clayton-le-Moors (Lancs) U.D.C. Tenders to be invited for erection of 20 houses on Field Bottoms estate.

Coleraine (Londonderry). R.D.C. to erect six houses at Mettican, and is to proceed with erection of 16 houses at Ballylintagh and 17 at Kilrea.

Coventry. Conversion of existing premises for school purposes at Baginton Hotel. Apply to W. L. Chinn, Director of Education, The Council House, Coventry.

Darlington. Newcastle Regional Hospital Board has approved a £130,000 remodelling scheme at Darlington Maternity Hospital.

Eastry (Kent) R.D.C. It is proposed to erect 28 houses at Aylesham, 40 at Eastry, and 4 at Minster.

Fort William (Inverness) T.C. Negotiations are in hand for erection of 26 houses on second development site at Clabgan.

Hamilton (Lanark) T.C. Dean of Guild Court has approved plans for erection of 42 houses on Neilsand Rd. site at estimated cost of £52,000.

Hartlepool T.C. Contract to be let for erection of 24 houses. Borough Engineer is R. H. Snowball.

Haverfordwest (Pemb.) T.C. 96 houses to be built in Mount Airey, and 20 in Jury La. Also 100 concrete houses are to be erected on Hawthorne Cottage estate, Portfield.

Inverness. Dean of Guild Court approved plans for alterations to Balmoral Restaurant, Queensgate, estimated to cost £6,000.

Jarrow. Bede Trading estate is the site for a new factory. Architects are Stephenson and Gillis, Saville Chambers, North St., Newcastle-on-Tyne.

Kensington. Council recommended to approve installation of electricity at Talbot Grove Hse., Penzance St., and at 20a Adair Rd., at a cost of £4,500.

Kingston-on-Thames. T.C. recommended to invite tenders for erection of 80 houses on Chessington Hall site.

Kirkintilloch (Dumbarton) T.C. Further 24 houses to be built at Lugiebank and Stubblebroomhill.

Lexden and Winstree (Essex) R.D.C. It is proposed to erect 11 houses at West Bergholt, 10 at Boxted, 8 each at Stanway and Tiptree, and 4 each at Layer-de-la-Haye and Marks Tey.

Leyton T.C. Erection of 50 maisonettes at Harvey Rd. Development Area. Borough Engineer and Surveyor, Town Hall, E.10.

Longbenton U.D.C. Erection of 48 houses on Crossley Terrace scheme. A. E. Sweetman, Engineer and Surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne.

Macclesfield T.C. Erection of 18 houses on Ivy Rd. estate. Borough Architect, 3 Jordangate, Macclesfield.

March (Cambridge) U.D.C. Plans approved for erection of 100 houses on Badgeney Rd./Deerfield Rd. estate. Council's Architect is W. S. Pickett.

Newbury (Berks) R.D.C. Erection of 16 houses at Spleen. E. G. Hampshire, Surveyor, Phoenix House, Newbury.

Newcastle-on-Tyne. Municipal Buildings Committee recommend work to begin next year on erection of new Town Hall and municipal offices at Barras Bridge. Total cost estimated at £2 million, first stage of which will cost about £461,091. Plans by City Architect, George Kenyon, 18 Cloth Market, Newcastle.

Newport (Mon.). It has been announced by Cwmbran Development Corporation that 6,300 houses are to be built in connection with the development of a new town. Work is expected to begin on a site at Tynewydd early in the New Year.

Northern Ireland. Erection of 289 houses at Bangor, Co. Down; 74 at Portrush, Co. Antrim; and 39 at Kells, Co. Antrim; for Housing Trust. Documents from Trust Offices, 12 Hope St., Belfast.

Pewsey (Wilts) R.D.C. Proposal to erect 20 houses at Ludgershall has been approved.

Plymouth. Erection of primary school at Whitleigh. Louis de Soissons and Partners, 5 Portland Sq., Plymouth.

Rochdale. Erection of 207 dwellings on Kirkholt estate. W. H. G. Mercer, Borough Surveyor, Town Hall, Rochdale.

Romsey and Stockbridge (Hants). R.D.C. proposes to build 26 houses at Broughton, 14 at Romsey Extra, and 2 at Sherfield English.

Rugby (Warwick). R.D.C. is to erect 12 houses and 4 bungalows at Stretton-on-Dunsmore, and 14 houses and 2 bungalows at Wolvey.

Scunthorpe T.C. A loan of £62,348 to East Midland Housing Assoc. has been approved for erection of 42 houses in Messingham Rd.

Southend-on-Sea. Erection and completion of first instalment of new school at Belfairs. Architect to Education Committee, Municipal Buildings, 30 Alexandra St.

Staines. C.C. recommended to instruct Architect to arrange for installation of electric lighting and power at Kingston Rd. primary school.

Street (Somerset) U.D.C. Plans approved for erection of 2 houses at Slug Hill, and tenders are to be invited for erection of 22 houses on the Portland site.

St. Marylebone. Preliminary plans have been approved for erection of county primary school in Finchley Rd. at estimated cost of £76,130.

Sutton and Cheam (Surrey). Erection of 52 houses in Danescourt Cres. N. H. Michell, Borough Engineer and Surveyor, Municipal Offices, High St., Sutton.

Tottington U.D.C. Erection of 16 houses on Leeman's Hill estate. Architect, Frank Bradley, Penny Bank Chambers, 4 Wood St., Bolton.

Widnes T.C. Erection of Fairfield secondary modern school. Borough Architect, Brendan House, Widnes Rd.

Wood Green (Middx.). C.C. recommended to authorise improvement of electric lighting system at Noel Park secondary modern, junior and infants' schools. Work to cost £1,198.

(Business Prospects cont.)

Wolverhampton T.C. Erection of 79 houses near the town's airport.

OVERSEAS

U.S.A. The Case Chemical Co., of 10014 Hough Avenue, Cleveland, are interested in obtaining supplies of No. 15 varnished and insulated wire, and No. 18 wire, varnished, insulated and glass coated. Manufacturers should communicate with Mr. R. M. Kovel.

Yugoslavia. The President of Foreign Trade Committee of Montenegro would like to have catalogues of U.K. machinery for use in mining, quarrying, generating power, handling timber, mobile light port equipment, restaurant refrigerators and refrigerated lorries. Interested manufacturers should contact Komitet za Vanjsku Trgovinu, Narodne Republike Crne Gore, Hercegnovi, Yugoslavia.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

W. & G. (Surbiton) Ltd., 29 Mincing Lane, E.C.3. Mechanical, constructional, motor, electrical and general engineers, etc. Nom. Cap.: £100. Dirs.: Not named. Subs.: F. H. Worters, Granville House, Limpsfield, Surrey, and J. Seton Guthrie.

Decolectric (Stanmore) Ltd., 27 Grange Av., Stanmore. Electrical, hydraulic and general engineers, etc. Nom. Cap.: £100. Dirs.: E. J. Mansell and W. H. White.

Harvey Electronics Ltd., 4 Downing St., Farnham, Surrey. Nom. Cap.: £1,000. Dirs.: J. P. Harvey and Mrs. C. M. E. Harvey.

Radio Maintenance (Northern) Ltd., 8 Grimshaw St., Burnley. Nom. Cap.: £500. Dirs.: A. R. Duckett and Mrs. A. Duckett.

Joy-Scott Refrigeration Co. Ltd., 178 Bowes Rd., N.17. Nom. Cap.: £15,000. Manufacturers, refrigeration and mechanical engineers, etc. Dirs.: W. J. E. Lee and H. S. Howell.

Pearce Transformer Co. Ltd., Standard House, 52-54 Grays Inn Rd., W.C.1. Electrical equipment and scientific instrument specialists, etc. Nom. Cap.: £10,000. Dirs.: H. J. Pearce, Lt.-Col. J. H. G. Pearce and F. W. Alien.

Silcocks Services (Romford) Ltd., 5 Gt. Winchester St., Old Broad St., E.C.2. Electricians, mechanical engineers, etc. Nom. Cap.: £500. Dirs.: E. H. Silcocks and Emma Silcocks, F. H. Hardingham and Constance L. M. Hardingham.

Verrolec Ltd., Farleigh House, Lawrence Lane, E.C.2. Electrical engineers and contractors, etc. Cap.: £100. Dirs.: L. M. Turnbull and L. J. Bussey.

MEETINGS TO NOTE

THURSDAY, DEC. 14

DUNFERMLINE ELECT. SOC.—"Television." R. T. Frost, of Pye Ltd. Unitas Hall, Queen Anne St., 7 p.m.

I.E.S. (Gloucester and Cheltenham Centre).—"Sports Lighting." D. E. Beard. Cadena Cafe, Eastgate St., Gloucester, 6.30 p.m.

I.E.S. (Leicester Centre).—"Electronic Flash Tube." A. J. Meadowcroft. E. Midland Elect. Board, Charles St., 6.30 p.m.

I.E.S. (Manchester Centre).—Luncheon meeting at Midland Hotel, 12.30 p.m. Presidential address. L. J. Davies. Manchester Town Hall Extension, 6 p.m.

INCORP. PLANT ENGRS. (Kent Branch).—"Thermostatic Control." T. W. Park. Maidstone Tech. College, 7 p.m.

I.E.E. (N.E. Scotland Sub-Centre).—Scottish Centre's chairman's address. J. Henderson. Royal Hotel, Union St., Dundee, 7 p.m.

I.E.E. (W. Wales Sub-Centre).—"The Phase/Neutral System of Supply for Rural H.V. Distribution." G. T. Garwood and G. J. Websdale. Plaza Cinema, Swansea, 6 p.m.

INST. OF WELDING (N. London Branch). "Welding of Heavy Machine Parts." C. E. Moore. Enfield Tech. College

FRIDAY, DEC. 15

INSTN. OF HEATING AND VENTILATING ENGRS. (Scottish Centre).—Annual dinner and dance at Grand Hotel, Glasgow. 7.30 p.m.

BRIT. INSTN. OF RADIO ENGRS. (London Section).—Discussion on "Progress in Loudspeaker Design." School of Hygiene and Tropical Medicine, Gower St., W.C.1. 6.30 p.m.

I.E.E. (E. Midland Centre).—"Modern Discharge Lamps." A. E. Bird. Coll. of Technology, Leicester. 6.30 p.m.

I.E.E. (N.E. Scotland Sub-Centre).—"Analogies." Prof. M. G. Say. Robt. Gordon Tech. College, Aberdeen. 7.30 p.m.

I.E.E. (Western Utilisation Group)—Annual dinner.

SATURDAY, DEC. 16

INSTN. OF MECHANICAL ENGRS. (Southern Branch). Luncheon and Presidential address. S. F. Dorey. Kimbells Restaurant, Portsmouth, 12.30 p.m.

MONDAY, DEC. 18

I.E.E. (N.E. Radio Group).—"Electronic Counters and Some Applications." R. B. Conn. King's College, Newcastle. 6.15 p.m.

I.E.E. (London Radio Section).—Discussion on "Have Post-war Broadcast Receivers taken full Advantage of War-time Development?" Savoy Pl., W.C.2. 5.30 p.m.

I.E.E. (S. Midland Supply and Utilisation Group).—"Some Aspects of Agricultural and Horticultural Electrification in N. America." F. E. Rowland. Imperial Hotel, Birmingham. 6 p.m.

I.E.E. (Western Supply Group).—"Fault Throwing Tests on 132 kV Grid System under Normal Working Conditions." W. Casson and F. H. Birch. Elect. House, Colston Ave., Bristol. 6 p.m.

A.S.E.E. (Central London Branch).—"Oil Switchgear Failures and Their Causes." N. Elliott. St. Ermin's Hotel, S.W.1. 6.50 p.m.

TUESDAY, DEC. 19

A.S.E.E. (London). — "Modern Methods of Generation." J. H. Beard. Lighting Service Bureau, 2 Savoy Hill, W.C.2, 6.30 p.m.

INCORP. PLANT ENGRS. (Glasgow Branch).—"Refrigeration and some Industrial Applications." P. D. Cowell. 351 Sauchiehall St. 7 p.m.

I.E.E. (N.W. Measurements and Supply Groups).—Discussion on "High Voltage Tests and Measurements in Practice." Engineers' Club, Albert Sq., Manchester. 6.15 p.m.

I.E.E. (Scottish Centre).—"Cost and Efficiency of Earthing on Low and Medium Voltage Overhead Line Systems." L. Gosland. 39 Elmbank Cres., Glasgow. 7 p.m.

WEDNESDAY, DEC. 20

I.E.S. (Teeside Group).—"Acrylic Plastics in Lighting." P. Collins. Cleveland Scientific and Tech. Inst., Corporation Rd., Middlesbrough.

INSTN. OF HEATING AND VENTILATING ENGRS. (S.W. Branch).—Annual dinner and social evening at Bristol.

I.E.E. (London Supply Section).—"Design and Performance of Surge Diverters for the Protection of A.C. Systems." T. F. Monahan. Savoy Pl., W.C.2. 5.30 p.m.

I.E.E. (N. Lancs Sub-Centre).—"The General Aspects of Television." A. J. Biggs. Harris Inst., Corporation St., Preston. 7 p.m.

I.E.E. (Southern Centre).—"Design and Operation of a 30-MeV Synchrotron." D. W. Fry, J. Dain, H. H. H. Watson and H. E. Payne. Grand Hotel, Bournemouth, 6.30 p.m.

A.S.E.E. (Manchester Branch).—"Principles of Organisation." D. V. Burling. Engineers' Club, Albert Sq. 7.30 p.m.

Bi-metal is a case where the whole is greater than the sum of the parts. By permanently bonding together noble and base metals, a composite material is produced from which a wide variety of electrical contacts can be produced by simple pressing operations, thus obtaining greater economy in production costs coupled with the highest operational efficiency.

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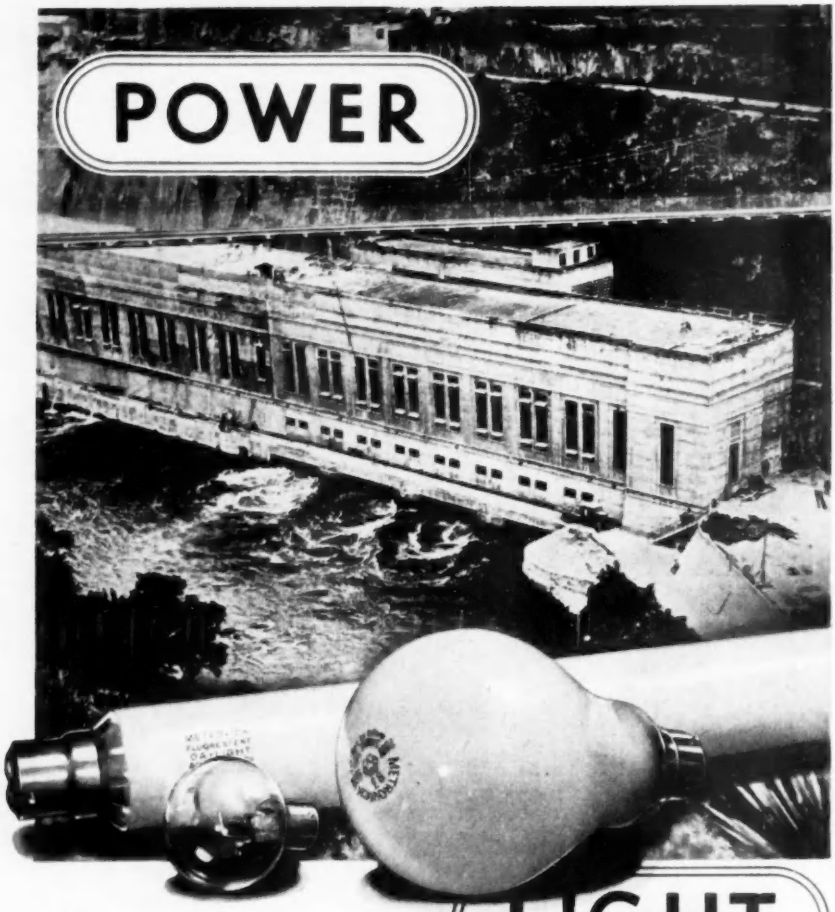

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

COUNTY BOROUGH OF HASTINGS

Electrical Installation

116 HOUSES—RECTORY SITE, HOLLINGTON

THE Council invite tenders from Electrical Contractors for the electrical installation to the above houses.

Drawing, specification, etc., can be obtained on request from the Borough Engineer, 37 Wellington Square, Hastings, on receipt of a deposit of £2 2s., which will be returned on receipt of a bona-fide tender, together with all documents, etc.

Tenders, sealed in the envelope provided, are to be delivered to the undersigned not later than 2 p.m. on Monday, January 8, 1951.

The Council do not undertake to accept the lowest or any tender.

N. P. LESTER,
Town Clerk.

Town Hall,
Hastings. (H 130)

METROPOLITAN WATER BOARD

MANUFACTURE, DELIVERY AND ERECTION OF A MAIN LOW-TENSION SWITCHBOARD AT THE BOARD'S PUMPING STATION, ASHFORD COMMON, MIDDLESEX

TENDERS are invited for the above installation. Documents can be inspected at the Board's offices, and tender forms may be obtained on depositing the sum of one guinea, which is returnable on receipt of a bona fide tender.

Tenders on the prescribed form, enclosed in sealed envelopes, addressed to the undersigned and endorsed "Tender for Main L.T. Switchboard, Ashford Common," must be delivered at the offices of the Board (Room 122) not later than 12 noon on Wednesday, January 24, 1951.

The Board do not bind themselves to accept the lowest or any tender.

W. S. CHEVALIER,
Clerk of the Board.

Offices of the Board, New River Head, Rosebery Avenue, London E.C.1. (H 131)

COUNTY BOROUGH OF BELFAST

Electricity Department

TENDERS are invited for the supply, delivery, and erection at the Harbour Power Station, Belfast, of :—

(a) Co_2 Fire Fighting Equipment for the protection of 6,600 volt Switchgear (Tender No. N.974).

(b) 33 kilovolt and lower voltage Cables (Tender No. N.951).

Forms of tender, conditions, specifications, and drawings, in quadruplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of five guineas in respect of each of items (a) and (b) (cheques to be made payable to the Belfast Corporation Electricity Department), which deposits will be refunded provided bona fide Tenders be lodged and not withdrawn. Extra copies of the contract documents may be obtained at three guineas per set, which sum will not be returnable.

Each tender, in quadruplicate, in sealed envelope, marked "Tender for....., Electricity Department," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, January 19, 1951.

An official receipt must be obtained for each Tender delivered by hand. Tenders sent by post should be registered.

The lowest or any Tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast,
December 8, 1950. (H 132)

APPOINTMENTS VACANT

EAST MIDLANDS ELECTRICITY BOARD

Lincolnshire Sub-Area

APPLICATIONS are invited for the post of ASSISTANT ENGINEER (Operation and Maintenance) at the Lincolnshire Sub-Area Headquarters.

Candidates should have had a sound technical and practical training in the maintenance and operation of both 33 kV and 11 kV systems.

The engineer appointed will be required to reside in Grantham and to undertake standby duties and to generally assist in the operation, maintenance and technical section of the Sub-Area Engineering Department.

The duties, although of a general character, will particularly concern the operation and maintenance of 33 kV lines and substations.

The position will be graded Third Assistant Engineer and the salary will be in accordance with Class "G," Grade 10-1, of the National Joint Board Agreement, commencing at £539 per annum.

Applications, stating age, qualifications and experience, and enclosing copies of recent testimonials, should be addressed to the Sub-Area Manager, The East Midlands Electricity Board, North House, Grantham, not later than January 1, 1951.

P. H. De KEYSER,
Secretary.
(H 122)

BRITISH ELECTRICITY AUTHORITY

North-Western Division

GENERATION (CONSTRUCTION) ENGINEER
VACANCY NO. 292

APPLICATIONS are invited from suitably qualified persons for position of Generation Engineer (Construction), at Divisional Headquarters, which is situated at Agecroft Generating Station, Pendlebury, near Manchester (2 vacancies).

The salaries will be within the range £1,250 to £1,750 per annum which is provisional pending negotiations with the appropriate body. The posts are superannuable.

Applicants must have had first-hand experience of work involved in the design, layout and construction of a new generating station, or an extension to an existing one.

The successful candidates will be responsible to the Chief Generation Engineer (Construction) for work on the development of new generating station sites, including their design and layout as well as extensions to existing stations.

Applications, stating age, education, present position and full details of training and experience, should be addressed to the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, to be received by him not later than December 30, 1950. (H 138)

MINISTRY OF LABOUR AND NATIONAL SERVICE

THE MINISTRY OF LABOUR AND NATIONAL SERVICE invite applications for the un-established post of TECHNICAL OFFICER (Man), as Assistant to the Head of the Electrical Engineering Section of the Technical and Scientific Register.

Candidates should hold a degree in Electrical Engineering and or an equivalent professional qualification, and have had industrial experience in heavy electrical engineering.

Salary is within the range £650 x £25—£800 per annum, according to qualifications and experience.

Write for application forms quoting D 381/50A to the Ministry of Labour and National Service, Technical and Scientific Register (K), York House, Kingsway, W.C.2. Closing date : January 6, 1951. (H 97)

BRITISH ELECTRICITY AUTHORITY

Labour Relations Department, Headquarters, London

SECOND ASSISTANT ENGINEER (SAFETY)

APPLICATIONS are invited for the post of Second Assistant Engineer (Safety) in the Safety Section of the Labour Relations Department.

Applicants should have good engineering qualifications with experience in the work of accident prevention and a knowledge of the Factories Acts and relevant safety regulations. Preference would be given to those with experience in the electricity supply industry.

The successful candidate will be required to assist the chief safety officer in administration and technical work at headquarters and when necessary the Authority's regional safety officers.

The salary for the appointment, which is superannuable, will be in accordance with Grade 3 of the National Joint Board Agreement, £755 per annum to £1,017 per annum, according to qualifications and experience, rising ultimately to a maximum of £1,120 per annum, including London allowance throughout.

Applications, stating age, present salary and giving full details of qualifications and experience, should be forwarded to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, not later than January 1, 1951. Please quote Ref. AE/120. (H 112)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the appointment of SHIFT CHARGE ENGINEER at Llynfi Station, Aberkenfig, at a salary in accordance with the National Joint Board Revised Agreement, Class "F", Grade 7 (£625 to £643 per annum).

When the extensions at present under construction at this station are completed, the classification will be increased to Class "G" and the salary will then be £651 to £679 per annum.

Applicants should preferably have served a regular apprenticeship, obtained the Higher National Certificate and had previous operational experience in a modern generating station. The appointment will be superannuable under the British Electricity Authority and Area Boards Scheme.

Forms of application may be obtained from the Divisional Secretary at the address below to whom completed applications should be returned not later than December 28, 1950, in sealed envelope endorsed "Shift Charge Engineer, Llynfi."

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
December 4, 1950. (H 116)

LONDON ELECTRICITY BOARD

ASSISTANT DISTRICT COMMERCIAL OFFICER

APPLICATIONS are invited for the above position in the Wimbledon District of the South-Western Sub-Area.

Applicants will be required to assist the District Commercial Officer in the commercial organisation and development of the district, and must have sound experience covering:

Consumer service.
Commercial development of electricity supply.
Control of service centre, sales and staff.
Control of an electrical contracting and maintenance department and staff.
Administration and operation of hire and hire purchase schemes.

Preference will be given to applicants possessing the Higher National Certificate in Electrical Engineering.

Pending grading of the post under the national agreement of the appropriate negotiating body, the provisional salary will be fixed according to qualifications and experience up to a maximum of £650 per annum inclusive.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, on receipt of addressed foolscap envelope, to be returned, duly completed, not later than December 30, 1950. Please quote ref. EST V 1087 T on envelope and all correspondence. (H 145)

EAST MIDLANDS ELECTRICITY BOARD

Northamptonshire Sub-Area

APPLICATIONS are invited for the position of ROTARY SUBSTATION ATTENDANT at Bridge Street, Northampton. Wages and conditions of service in accordance with the Agreement of the National Joint Industrial Council for the electricity supply industry, the present rate of pay, including shift work and isolating and earthing enhancements, being 2s. 11¼d. per hour for an average of 44 hours per week.

Applications, giving full details of age and previous experience, should be addressed to the Sub-Area Secretary, East Midlands Electricity Board, 25 Bridge Street, Northampton. (H 113)

SOUTHERN ELECTRICITY BOARD

No. 2 (Newbury) Sub-Area

APPLICATIONS are invited for the post of DRAUGHTSMAN (BUILDING AND CIVIL WORKS) :—

Duties : To prepare Drawings of Buildings and Civil Works, under the supervision of the Assistant Engineer (Civil).

Qualifications : Applicants should have had experience of similar work, preferably with a Firm of Architects or large Contractors, and to have received a recognised Course of training will be an advantage.

Salary and Conditions of Service: The salary, which is provisional and subject to adjustment by the appropriate negotiating body, will be £450 per annum. Conditions of Service will be as prescribed from time to time. The successful applicant will, if eligible, be required to join the B.E.A. and Area Boards' Superannuation Scheme.

Applications: On a standard form to be obtained from the Sub-Area Secretary and returned to him at 7 Oxford Road, Newbury, not later than ten days after the appearance of this notice.

F. W. KEMPTON,
Secretary.
(H 144)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

BOILER HOUSE SHIFT CHARGE ENGINEER—NORTH WILFORD

APPLICATIONS are invited for the position of Boiler House Shift Charge Engineer, North Wilford Generating Station, Nottingham.

Applicants should have had a sound technical training, a good general engineering experience and a knowledge of the control and operation of large pulverised fuel boilers and associated equipment. Preference will be given to candidates who are in possession of technical qualifications admitting to Corporate Membership of a recognised professional institution.

The salary will be in accordance with Class "K," Grade 9 of the National Joint Board Schedule and the post will be superannuable within the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer at the undermentioned address, and returned to him not later than December 26, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate,
Nottingham. (H 21)

SCUNTHORPE HOSPITAL MANAGEMENT COMMITTEE

Lincolnshire Radiotherapy Centre

THERE is a vacancy for a TECHNICIAN in the Physics Department at the above Centre, for duties in connection with the maintenance and modification of X-ray sets and other electrical and electronic apparatus in the department. Applicants should have experience of high kilovoltage work and should be at least 24 years of age. Some experience of electrical fitting would be an advantage. Possession of an electrical qualification of the standard of Ordinary National Certificate or Higher School Certificate is desirable. The conditions recommended by the British X-ray and Radium Protection Committee are operative. Further particulars may be obtained from the Physicist at the address below. The salary scale is £370 by three increments of £15 and one of £20 to £435. The post is subject to the provisions of the National Health Service Superannuation scheme. Applications, giving full particulars of education, qualifications and experience, with names of two referees, should be sent to the Secretary, The War Memorial Hospital, Scunthorpe, Lincs. by December 31, 1950. (H 146)

KENT COUNTY COUNCIL

APPLICATIONS are invited for the appointment in the Buildings Department of an ENGINEERING ASSISTANT (Electrical), at a salary in A.P.T., Grade V (£520-£570).

The post is superannuable and the successful candidate will be required to pass a medical examination.

Applicants must be Graduate Members of the Institution of Electrical Engineers with at least five years' experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work.

Applications, on forms obtainable from the County Architect, Springfield, Maidstone, must be delivered to him not later than fourteen days after the appearance of this advertisement.

W. L. PLATTS,
Clerk of the County Council.

County Hall, Maidstone.
December 1, 1950. (H 55)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

STAFF VACANCY NOTICE

APPLICATIONS are invited for the position of POWER STATION SUPERINTENDENT at Kilmarnock Power Station.

Candidates should be qualified engineers with technical and practical experience in the operation and maintenance of a modern steam generating station of about 100 MW capacity. They should also have had experience in the administrative duties involved and in the control of technical and manual employees. Knowledge of pulverised fuel fired high pressure boilers will be considered an advantage. Candidates should preferably be Corporate Members of the Institution of Mechanical Engineers or of the Institution of Electrical Engineers or have equivalent qualifications.

The salary will be in accordance with Grade 1, Class "F," of Schedule "A" of the National Joint Board Agreement.

A house will be made available.

Applications, stating age, qualifications and experience, should be forwarded on Form A.E.6, which can be obtained from the Divisional Secretary, British Electricity House, 168 Broomhill Drive, Glasgow W.1, and should be returned to him not later than January 3, 1951.

E. J. EDGAR,
Divisional Controller.

December 6, 1950. (H 140)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT CHARGE ENGINEER—BURTON-ON-TRENT

APPLICATIONS are invited for the position of Assistant Charge Engineer at Burton-on-Trent Generating Station.

Applicants should have sound technical qualifications and experience in the operation and maintenance of modern power stations.

The salary will be in accordance with Class "E," Grade 9 and the appointment will be superannuable under the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, not later than December 26, 1950.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate,
Nottingham. (H 22)

BRITISH ELECTRICITY AUTHORITY

London Division

ELECTRICAL MAINTENANCE ENGINEER
DEPTFORD EAST GENERATING STATION

APPLICANTS must have received a sound general education and technical training, and have had a good practical training and experience of heavy electrical plant. The successful applicant will be responsible for the repair and maintenance of all switchgear, transformers, control gear and all electrical equipment.

Salary in accordance with revised N.J.B. Schedule, Class "H", Grade 7, plus London allowance: £726 12s. p.a.

Applications, stating age, qualifications and experience should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(H 114)

CITY OF SALISBURY, SOUTHERN RHODESIA

Electricity Department

VACANCY—CHIEF DISTRIBUTION ENGINEER
GRADE £1,108/16/- x £43/4/—£1,281/12/-

APPLICATIONS are invited, and will be received by the undersigned on or before January 1, 1951, for the post of Chief Distribution Engineer on the grade set out above which, with the present cost of living allowance, amounts to £1,207-£1,371, plus children's allowances of £30 per annum for the first child and £24 per annum for each subsequent child. Income tax is such that a married man with two children pays practically no income tax on this salary. A three-bedroomed house at £14 per month is provided.

Those interested, being in possession of a degree in Electrical Engineering and Corporate Membership of the Institution of Electrical Engineers, should write to the undersigned for further details. Davis and Soper Ltd., Agents to the City Council of Salisbury, 52 and 54 St. Mary Axe, London E.C.3.

November 29, 1950. (H 41)

BRITISH ELECTRICITY AUTHORITY

South West Scotland Division

STAFF VACANCY NOTICE

APPLICATIONS are invited for the position of POWER STATION SUPERINTENDENT at Braehead Power Station, Renfrew, which is situated three miles out of Glasgow on the south bank of the River Clyde.

Candidates should be qualified engineers with technical and practical experience in the operation and maintenance of large modern steam generating stations. Knowledge of pulverised fuel fired high pressure boilers will be considered an advantage. They should also have had experience in the administrative duties involved in the control of technical and manual employees. Preference will be given to applicants having had experience in the commissioning of new stations.

Candidates should preferably be Corporate Members of the Institution of Mechanical Engineers or of the Institution of Electrical Engineers or have equivalent qualifications.

The salary will be in accordance with Grade 1, Class "H," of Schedule "A" of the National Joint Board Agreement.

Applications, stating age, qualifications and experience, should be forwarded on Form A.E.6, which can be obtained from the Divisional Secretary, British Electricity House, 168 Broomhill Drive, Glasgow W.1, and should be returned to him not later than January 3, 1951.

E. J. EDGAR,
Divisional Controller.

December 6, 1950. (H 141)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SHIFT CHARGE ENGINEER, CHESTERFIELD

APPLICATIONS are invited for the position of Shift Charge Engineer at Chesterfield Generating Station.

Applicants should have a sound technical training and practical experience in the operation and control of steam generating plant and switchgear, and preference will be given to candidates who have a Higher National Certificate or equivalent qualifications.

The salary will be in accordance with Class "B," Grade 7 of the N.J.B. Schedule and the post will be superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which can be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than December 26, 1950

W. S. BURGE,
Divisional Controller.
(H 20)

BRITISH ELECTRICITY AUTHORITY

London Division

ASSISTANT SHIFT CHARGE ENGINEERS—WEST HAM GENERATING STATION

APPLICATIONS are invited for these positions from candidates with the necessary experience and qualifications.

The successful applicants will carry out the duties of Control Room Engineers or Boiler House Engineers, according to requirements, and will be directly responsible to the Shift Charge Engineer.

Salary in accordance with revised National Joint Board Schedule Class "G," Grade 9, plus London Allowance : £599 11.- per annum.

The appointments will be superannuable under the terms of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications and experience should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(H 95)

MINISTRY OF WORKS

THE Ministry of Works require an unestablished ENGINEERING ASSISTANT in the X-ray section of the engineering division for duty in Edinburgh or Glasgow. Candidates should have had experience in the maintenance of X-ray and physio-therapy apparatus, together with electrical power and lighting installations.

Qualifications: Higher National Certificate in electrical engineering desirable, with special consideration for applicants who are members of the Institute of X-ray Technology. Salary range: £485 to £610 per annum.

Forms of application may be obtained from the Ministry of Labour and National Service, Technical and Scientific Register, York House, Kingsway, W.C.2 (K), quoting D.342/50 A. Closing date January 12, 1951. (H 115)

BRITISH ELECTRICITY AUTHORITY

South Western Division

GENERAL ASSISTANT ENGINEERS—TECHNICAL DEPARTMENT

APPLICATIONS are invited for appointments as General Assistant Engineers in the Technical Department of the South Western Division at Bristol and Plymouth.

The salary and conditions of service will be in accordance with the National Joint Board Agreement, Class "AX CX," Grade 8, £437-£569-£592-£604 per annum.

Applicants should possess a University Degree in electrical engineering or be graduates or corporate members of the Institution of Electrical Engineers, and should have had at least two years experience in the works of a large manufacturer of electrical equipment.

The duties will include commissioning and maintenance testing of all types of electrical equipment in generating stations and substations. Experience in insulation testing and pressure testing of electrical equipment would be considered an advantage. A genuine interest in technical matters is essential.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than 31st December, 1950.

R. C. BARRETT,
Divisional Secretary.

4th December, 1950. (H 100)

AIR MINISTRY

AIR MINISTRY require MECHANICAL and ELECTRICAL ENGINEERS for duty in their Works department in connection with the design, operation and maintenance of ground mechanical and electrical works services on R.A.F. stations at home and overseas and on Civil Aviation stations.

Appointments will be in two grades with a maximum of (1) £750 (D 19/48-A) or (2) £1,000 (D 370/50-A) respectively. Commencing salary will be in accordance with age, qualifications and experience. A special allowance of up to £800 a year is payable in addition to salary during overseas service.

Candidates must be natural born British subjects.

The minimum qualifications and experience required for both grades of post are :—

(i) (a) University degree or equivalent diploma in electrical and or mechanical engineering and have had at least a two-year apprenticeship;
or (b) Graduate or corporate membership of the Institution of Electrical Engineers, or of the Institution of Mechanical Engineers with appreciable electrical engineering experience, and have served at least a three-year apprenticeship;
and (ii) have been employed in a responsible position for a minimum of three years with a well-established engineering concern, and there have gained wide experience in electrical and mechanical engineering practice.

Write, quoting D 19/48-A or D 370/50-A to : Ministry of Labour and National Service, Technical and Scientific Register (K), York House, Kingsway, London W.C.2.

Closing date : January 6, 1951. (H 96)

SOUTH EAST SCOTLAND ELECTRICITY BOARD

Southern Sub-Area

APPLICATIONS are invited for the following appointments :—

1. ASSISTANT ENGINEER (Berwick District), Class "B," Grade 7 (£492-505-518). Applicants should have experience in the construction, operation and maintenance of H.V. and L.V. rural and urban distribution systems.

2. GENERAL ASSISTANT ENGINEER (Construction), Class "G," Grade 13 (£433-441-£449). Applicants should be able to survey, profile and schedule H.V. and L.V. wood pole lines and negotiate wayleaves.

3. JUNIOR ENGINEERS, Class "G," Grade 16 (£375-381-£387). Applicants should be young engineers wishing to gain further experience of rural and urban distribution work.

Applicants for all the above vacancies must have had a sound practical training and preference will be given to those holding the Higher National Certificate or equivalent.

The appointments will be superannuable under the B.E.A. and Area Boards' Superannuation Scheme.

Applications stating age and particulars of education, training, experience and positions held, should reach the undersigned not later than 14 days after the appearance of this advertisement.

G. H. SANKEY,
Sub-Area Manager.

High Street,
Galashiels. (H 94)

SOUTH EASTERN ELECTRICITY BOARD

Area Board Headquarters

SECOND ASSISTANT ENGINEER (CONSTRUCTION)

SALARY commencing at £752 p.a. under the N.J.B. Schedule Class "AX," Grade 2. Superannuation will be arranged. Applicants should be suitably qualified and preferably corporate Members of the I.E.E. They should have had a sound engineering training and responsible experience in the design and construction of overhead lines, the laying of underground cables, and the layout of substations at voltages up to 33 kV, supplying urban and rural networks.

Applications, giving two referees, must reach The Engineer-in-Chief, South Eastern Electricity Board, 1 Queen's Gardens, Hove 3, Sussex, by December 28, 1950.

Central Sussex District

FIRST ASSISTANT DISTRICT ENGINEER

Salary of £662 p.a., rising to £694 p.a. under the N.J.B. Schedule, Class E, Grade 5. Superannuation will be arranged. Applicants should have suitable technical qualifications and be competent in the planning, construction, operation and maintenance of overhead and underground distribution systems up to 11 kV. A knowledge of 33 kV practice an advantage. This mainly rural district has at present 382 miles of H.T. and 353 miles of L.T. mains and 596 Substations. The person appointed will be required to reside in or near Haywards Heath.

Applications, giving two referees, must reach A. M. Harker, Esq., Central Sussex Manager, South Eastern Electricity Board, Electra House, Church Road, Haywards Heath, Sussex, by December 28, 1950.

A. L. BURNELL,
Secretary.

December, 1950. (H 137)

EASTERN ELECTRICITY BOARD

Norfolk Sub-Area

ELECTRICITY SERVICE MANAGER, KING'S LYNN AND WESTERN DISTRICT—HUNSTANTON BRANCH

APPLICATIONS are invited for the appointment of Electricity Service Manager in the King's Lynn and Western District of the Norfolk Sub-Area.

Candidates should have had sound training in the Electricity Supply Industry. Commercial practices and wide experience in the preparation of specifications and estimates for all forms of installation work. Experience in rural development would be an added qualification.

The provisional salary for this appointment will be in accordance with Grade 8(E) of the National Joint Board Salary Scale, (£550-£555-£560), and future salary and conditions of service will be subject to agreements made from time to time by the appropriate negotiating bodies.

The successful applicant will be required to contribute to a Superannuation Scheme and may be required to undergo a medical examination.

Applications, stating age, experience, education, qualifications and details of present appointment, should be addressed to The Manager, King's Lynn and Western District, Eastern Electricity Board, Gaywood Bridge, King's Lynn, Norfolk, to reach him, not later than fourteen days after the appearance of this advertisement. (H 143)

BRITISH ELECTRICITY AUTHORITY

COMMERCIAL DEPARTMENT

APPLICATIONS are invited for a limited number of appointments in the Commercial Department at the Authority's Headquarters in London.

The duties will include the preparation of estimates of the cost of production at generating stations, of revenue and capital budgets and detailed work in connection with bulk supply and retail tariffs and commercial reports.

Candidates for the engineering posts should possess a university engineering degree and or the requisite qualifications for membership of the Institution of Electrical or Mechanical Engineers. Experience of the operation, commercial activities and general economics of the electricity supply industry will be an essential qualification of all applicants.

Salaries for the appointments involving engineering work will be fixed within the ranges from £490 to £1,285 per annum (inclusive of London Weighting) in accordance with the appropriate grade under the National Joint Board Agreement for Technical and Engineering Staff.

Salaries for the non-engineering appointments will be fixed within the ranges from £480-£1,060 per annum (inclusive of London Weighting) in accordance with the appropriate grade under the National Joint Council Agreement for Administrative and Clerical Staff.

Letters of application, stating age, present salary, and giving full details of qualifications and experience, should be addressed to D. Moffat, Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, so as to be received not later than January 1, 1951.

Please quote reference AE 121. (H 121)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

MAINTENANCE ENGINEER (MECHANICAL)—FERRYBRIDGE POWER STATION

APPLICATIONS are invited for the appointment of Maintenance Engineer (Mechanical) at Ferrybridge Power Station.

Conditions of service and salary will be in accordance with the National Joint Board Agreement, Class "H," Grade 6, £751 to £783 per annum.

Applicants should, preferably, be Corporate Members of the Institution of Mechanical Engineers and should have extensive experience in a responsible position in the maintenance of high pressure steam turbine and boiler plant and auxiliaries.

The appointment will be subject to the provisions of the Authority's Superannuation Scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, Yorkshire Division, British Electricity House, St. Mary's Road, Leeds 7, to whom completed forms should be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed "Maintenance Engineer (Mechanical)."

G. A. VOWLES,
Divisional Controller.
(H 92)

BRITISH ELECTRICITY AUTHORITY

North-Western Division

APPLICATIONS are invited for the position of STATION SHIFT CONTROL ENGINEER at the Kearsley Generating Station, Stoneclough, near Manchester.

The salary for this position, which is superannuable, will be in accordance with Grade 10, Class "K" of the Revised N.J.B. Schedule, i.e., £646 to £674 per annum.

Candidates should preferably possess technical qualifications, and previous experience in a generating station is desirable.

Applications, stating age, qualifications, and giving full details of education and experience, should be received by the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than December 23, 1950. (H 139)

LONDON ELECTRICITY BOARD

METER REPAIRER (MECHANICIAN)

APPLICATIONS are invited for the above position at Acton Lane, Willesden, N.W.10.

Rates of pay and conditions of employment will be in accordance with the agreement of the National Joint Industrial Council for the Electricity Supply Industry, the present rate of pay being 3/3 per hour, which amounts to £7 3/- per 44-hour week.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, on receipt of addressed foolscap envelope. Please quote ref. : EST/M/375/T on all correspondence. (H 98)

EASTERN ELECTRICITY BOARD

Essex Sub-Area Thurrock District

VACANCY: JOINTER CLASS I

APPLICATIONS are invited for the position of Jointer, Class "I," in the Thurrock District.

The rate of pay and conditions of service will be as laid down by the National Joint Industrial Council for the Electricity Supply Industry. Present rate 3s. 3d. per hour for a 44-hour week.

Applications, stating age, experience and present employment, should be forwarded to the District Manager, Thurrock District, Eastern Electricity Board, Maidstone Road, Grays, Essex. (H 142)

MIDLANDS ELECTRICITY BOARD

Wolverhampton and District Sub-Area

APPOINTMENT OF GENERAL ASSISTANT ENGINEER —WOLVERHAMPTON DISTRICT

APPLICATIONS are invited for the above post in the Wolverhampton District.

Applicants should have had experience in all branches of distribution work, including the operation and maintenance of high and low voltage cables, supervision of cable laying and control of constructional gangs. Appropriate technical qualifications will be considered an advantage.

The conditions of service will be in accordance with N.J.B. Agreement and the salary, subject to negotiation, will be Class "C," Grade 12, £468 £488 per annum.

Applications in writing, stating age, qualifications, experience and present salary, should be forwarded within 14 days to : Mr. F. J. Elliott, Manager, Midlands Electricity Board, 83 Darlington Street, Wolverhampton.

A. STEPHENS,
Secretary.
(H 93)

NORTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

No. 3 Sub-Area

GENERAL ASSISTANT ENGINEER
(Installation Assistant—(Contracting) (50/223)

The salary for the post, which is superannuable, will be in accordance with Class "J," Grade 13, of the Revised National Joint Board Agreement, i.e. £486-£496-£506 per annum.

The duties will include the preparation of estimates for tenders in contracting work, canvassing for Industrial, Commercial and Domestic Installation Contracts, and the supervision of the installation of wiring for:

(a) Industrial lighting schemes.
(b) Domestic installations.
(c) Street lighting.
(d) Motors and plant on consumers' premises.
(e) Change-over from D.C. to A.C.

Applications stating age, experience and qualifications, present post and salary, should be received by E. Binns, Esq., M.I.Mech.E., A.M.I.E.E., No. 3 Sub-Area Manager, The North Western Electricity Board, No. 3 Sub-Area Headquarters, Union Street, Oldham, not later than Saturday, December 30, 1950.

No. 6 Sub-Area

TWO STOCKTAKERS (50/220)

The successful candidates will be domiciled in Barrow and Carlisle.

Applicants should have a sound knowledge of stores ledgers and stores records, and be able to recognise the materials used in the Electricity Supply Industry. Ability to drive a motor vehicle would be an advantage.

The salary for the post will be in accordance with Grade 2 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry Salary Grades, i.e. £390 x £20-£450 per annum.

SECOND ASSISTANT ENGINEER
(System Planning) (50/221)

The salary will be in accordance with the revised National Joint Board Schedule, Class "H," Grade 7, i.e., £692-£707-£722 per annum. The post is superannuable.

Applicants should have had a sound training in Electrical Engineering and preference will be given to applicants who hold an Engineering Degree or who have attained Higher National Certificate standard.

Candidates should also have experience in several of the following branches of the work:

1. Estimating and planning of 35-kV and lower voltage overhead and underground systems.
2. Sub-station design.
3. Calculation of load flow and system fault levels, etc.
4. Application of system protective gear including calculation of load and time settings.
5. Preparation of estimates and specifications for Electrical Plant and equipment.

THIRD ASSISTANT ENGINEER
(Statistics) (50/222)

The salary will be in accordance with the Revised National Joint Board Schedule, Class "H," Grade 10, i.e., £571-£584-£597 per annum. The post is superannuable.

Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering or an equivalent qualification.

Applicants should have a good knowledge of distribution practice and experience in the following:

1. Collection, tabulation and analysis of technical data relating to distribution systems.
2. Preparation of reports on future load developments.
3. Correlation of data compiled by Consumers' Engineer's Department with Distribution Records for use in System Planning and Design.

Some knowledge of network calculations and the application of protective gear would be an advantage.

Applications, stating age, qualifications and experience, present post and salary, should be received by the Sub-Area Manager, The North Western Electricity Board, No. 6 (Lakeland) Sub-Area, Castle Green, Kendal, not later than Saturday, December 30, 1950. (H 147)

BRITISH BROADCASTING CORPORATION

B.B.C. invites applications for the post of ENGINEER in the Wiring Section of Planning and Installation Department based in London. The starting salary is £565 p.a. (may be higher if qualifications and experience are exceptional), rising by annual increments on a five-year progression to £725 p.a. maximum. Applicants should preferably have served an apprenticeship with a reputable firm of electrical contractors and be fully experienced in the planning and execution of all types of L.V. and M.V. electrical installation work. They should be conversant with estimating procedure, be able to write specifications and examine and summarise tenders. In addition, ability to supervise contracts is essential. Applications, stating age, qualifications and experience, to reach Engineering Establishment Officer, Broadcasting House, London W.1, within seven days. (H 99)

BRITISH ELECTRICITY AUTHORITY

Merseyside and North Wales Division

APPLICATIONS are invited for the appointment of MECHANICAL MAINTENANCE ASSISTANT at the Clarence Dock power station. Salary, Class "K", Grade 13, £515-£537 per annum, this grading should be regarded as provisional pending confirmation of the National Joint Board.

Applicants must have experience in mechanical maintenance of power station plant and should possess the Higher National Certificate in mechanical engineering or equivalent qualifications.

The appointment will be superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme, and subject to a medical examination.

Forms of application may be obtained from the Divisional Secretary, Clarke Gardens, Woolton, Liverpool, and returned to him not later than Monday, January 1, 1951.

A. R. COOPER,
Divisional Controller.
(H 149)

A FEW attractive vacancies for DRAUGHTSMEN exist at the Liverpool works of the English Electric Co. Ltd. The work is of electro mechanical nature, but any draughtsmen with experience on the design and detailing of mechanisms or welded fabrications or, in fact, any kind of medium mechanical equipment, will be considered. Excellent opportunities for advancement in this interesting field.—Please write, giving full details, mentioning reference 135A, to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, Westminster, S.W.1. (G 793)

ABERDARE CABLES LTD., Aberdare, require two ESTIMATORS competent to handle home and export inquiries for Paper Insulated Cables.—State age, experience, and salary required. Pension scheme. (H 27)

APPLICATIONS are invited for the post as SHIFT CHARGE ENGINEER at the Trading Estate Power Station, Slough. Candidates should possess good technical qualifications and be familiar with Power Station operation routine, and experienced with h.p. and l.p. boilers, turbo-alternators and ancillary equipment e.h.t. and l.t. switchgear. Commencing salary £579 per annum. A contributory pension scheme in operation.—Applications giving particulars of training, subsequent experience, together with copies of recent testimonials, to be addressed to the Chief Engineer, Slough Estates Ltd., Trading Estate, Slough. (H 51)

APPLICATIONS invited from recently qualified young men with good Honours Degrees in Electrical Engineering for initial further practical training in this country prior to overseas service with large Middle East oil company. Must be single. Pensionable posts, carrying substantial salary and allowances.—Write, with full informative detail and quoting No. 18, to Box No. 3832, c/o Charles Barker and Sons Ltd., 31 Budge Row, E.C.4. (H 86)

ASSISTANT BUYER required by old-established manufacturing electrical engineers, Manchester.

Applicants should have previous buying experience and first-class knowledge of engineering markets. They should be not more than 35 years of age. Commencing salary about £500 per annum, dependent on experience. Staff pension fund. 5-day week. Full canteen facilities. —Full particulars of age, experience and salary to Box No. 1991, Electrical Times. (H 81)

ASSISTANT CHEMIST. Inter B.Sc. Standard or National Certificate, with experience of modern power station practice and associated laboratory work, required by London firm of consulting engineers.

Applications, in writing, should state experience, qualifications and salary required, and should be addressed to the Secretary, Ewbank and Partners, 15 Grosvenor Place, S.W.1. (H 91)

ASSISTANT ENGINEER, aged about 26 to 30 and having completed apprenticeship, required in London sales office. Knowledge of switchgear an advantage.—Reply, giving details of experience and salary, to Box No. 2011, Electrical Times. (H 128)

CONTRACTS MANAGER required by London electrical contractors. Responsible for estimating, supervision and methods development. Mainly industrial and commercial. Four assistant engineers. State age, experience and salary required.—Box No. 1995, Electrical Times. (H 102)

CONTROL GEAR ENGINEER wanted in the N.E. Able to prepare schemes from customers requirements. With experience in the design and manufacture of low tension electrical control gear.—Box No. 1999, Electrical Times. (H 104)

COST CLERK required by busy electrical contractors; conversant with pricing stores requisitions, etc. N.-W. suburb.—Box No. 2003, Electrical Times. (H 124)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

COTSWOLDS. ELECTRICAL ENGINEER, holding science degree or equivalent with recent electronics experience, in small company producing technical exhibits and scale models. Commencing salary £475 p.a. Excellent prospects.—Write: Edgley Studios, Ltd., Western Rd., Cheltenham. (H 119)

DESIGNERS for Distribution Transformers (up to 1,000 kVA) required by large manufacturers on Merseyside. Applicants must have Higher National Certificate in Electrical Engineering and previous experience of this class of work is desirable. Applications with full details of age, education and present position may be sent in confidence.—Applications should be clearly marked "Transformer Designers," Box No. 1979, Electrical Times. (H 17)

ELECTRICAL ENGINEER with drawing office experience for motor control gear with view to taking charge of design office. Apply: De Renzi Holmes and Co., Ltd., Fox's Lane, Wolverhampton. (H 106)

ELECTRICIAN, fully skilled, used to conduit installation work, experience in neon erecting, willing to travel, required by Electrical Engineers, East Coast. Progressive position.—Apply, Box No. 2005, Electrical Times. (H 125)

ENGINEER with drawing office experience required by Consulting Engineers. Must be able to produce designs and finished drawings for electrical installations for buildings and factories and supervise the work to completion.—Write, stating salary, to Box No. E.T.417 at 191 Gresham House, E.C.2. (H 85)

ENGINEER with experience in the design and manufacture of electrical control gear wanted in the Manchester district to take charge of a control gear department. Good salary and conditions to the right man.—Box No. 1997, Electrical Times. (H 103

ENGINEERS required for Steam Turbine Design Department of large manufacturer in the Midlands. Candidates should have technical qualifications up to Higher National standard, preferably with shop and drawing office training.—Write: Box No. 1989, Electrical Times. (H 66)

ENGLISH ELECTRIC, Stafford, require TRANSFORMER DESIGN ENGINEERS for high-power systems in which surge impulse phenomena is a primary consideration. Good engineering qualifications desirable, and practical experience on transformer design problems essential.—Write, giving full details, quoting ref. 225D, to: Central Personnel Services, English Electric Co. Ltd., 24-30 Gillingham Street, London S.W.1. (H 68)

ERECTION ENGINEER required. Duties would be mainly concerned with supervising erection and commissioning of transformers and on load tap changers on site.—Write stating age, experience and salary required, to Box No. 2009, Electrical Times. (H 127

EXPERIENCED SENIOR DRAUGHTSMEN urgently required by a well-known manufacturer for employment in the Midland and London areas. Excellent opportunities for men experienced in switchgear layouts and design. These are senior vacancies carrying salaries of up to £600 per annum, and good possibilities exist for the provision of accommodation in the Midland area for suitable married applicants.—Write, giving full details of age, qualifications and previous experience, quoting Ref. ADA, to Box No. 1959, Electrical Times. (G 810)

FERRANTI LIMITED require an energetic man to take charge of heavy engineering assembly shops. Candidates must have sound engineering experience, but above all must have proved qualities of leadership and drive. The position carries responsibility to the Works Manager and involves the supervision of Foremen. Salary will depend on experience and ability and a high figure will be paid to a suitable man. The Company has a staff pension scheme.—Application forms from the Staff Manager, Ferranti Limited, Hollinwood, Lancs. Please quote Reference T.S. (G 778)

FERRANTI LIMITED invite applications for senior appointments of GRADUATE ENGINEERS with industrial experience in the design of electricity meters. The posts to be filled carry senior responsibility with excellent prospects, generous salary and pension.—Application forms from the Staff Manager, Ferranti Limited, Hollinwood. Please quite reference M.E. (H 38)

JUNIOR POWER STATION ENGINEER, age about 28, fully qualified and minimum five years' practical experience, required by British managed company in India. Four-year agreement. Salary equivalent to £1,440 p.a., rising to £1,675 for fourth year. Excellent opportunity appointment managing engineer about five years. Free quarters, medical attention and passages provided. Under non-contributory pension scheme approximately £270 p.a. payable at age of 55.—Write, giving full details, to Box 3845 c/o Charles Barker and Sons, Ltd., 31 Budge Row, London E.C.4. (H 152)

LIGHTING ENGINEER required in illuminating engineering department of Ekco-Ensign Electric, Ltd. Fully conversant with preparation of fluorescent and tungsten lighting schemes. The appointment carries a good salary and is pensionable.—Write, giving full details of experience, age, etc., to Chief Illuminating Engineer, 5 Vigo Street, W.1. (H 111)

JUNIOR CLERK required with experience of estimating work on small rubber, plastic and textile wires and cables. East London area.—Full details, age, salary required, to Box No. 2013, Electrical Times. (H 129)

JUNIOR ENGINEER required. Graduate or Higher National Standard for work involving control schemes, particularly in connection with on load tap changers. —Write, stating age, education, experience and salary required, to Box 2007, Electrical Times. (H 126)

LEADING Electric Cooker Manufacturer requires competent and experienced DEMONSTRATOR (female) based on the West of England, resident in or near Bristol an advantage.—Write, stating age, qualifications, experience and salary required, to Box No. 1983, Electrical Times. (H 34)

MAINTENANCE ELECTRICIAN for sawmill in West Africa. Age up to 35 years (approximately). Must be able to work on own initiative. Tour of service, 12-15 months. Salary, £840 per annum plus production bonus. Initial kit allowance, £40. Free furnished quarters. Fully paid home leave of one week for every month's service —Apply by letter, Box No. 1969, Electrical Times. (H 4)

MANUFACTURING engineering firm in Harrow have an opening for an ASSISTANT CONTRACTS ENGINEER. It is necessary to conduct correspondence with suppliers and customers and to follow individual orders through D.O., and works.—Box No. 2001, Electrical Times. (H 117)

REPRESENTATIVE required by old-established manufacturers of electric wiring accessories for the Lancaster and Yorkshire areas, on salary, expenses and commission.—Apply, with details of experience, etc., Box No. 1967, Electrical Times. (H 3)

SALES ENGINEER. Progressive post for young man with good technical training.—Apply De Renzi Holmes and Co., Ltd., Fox's Lane, Wolverhampton. (H 107)

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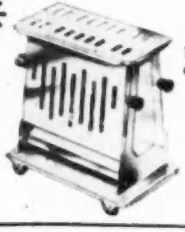

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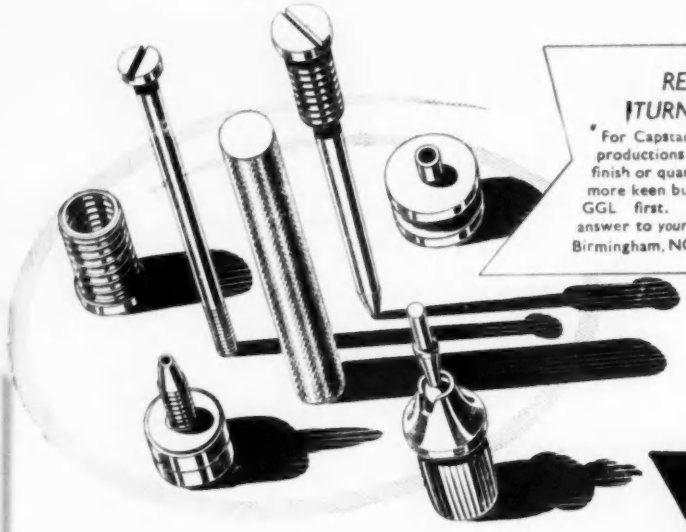

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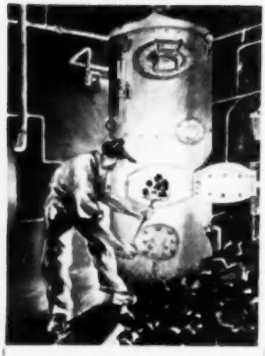

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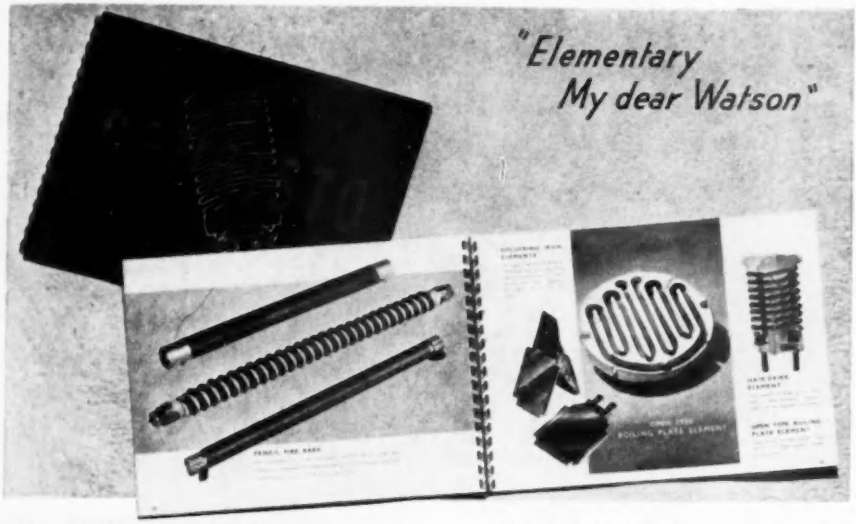

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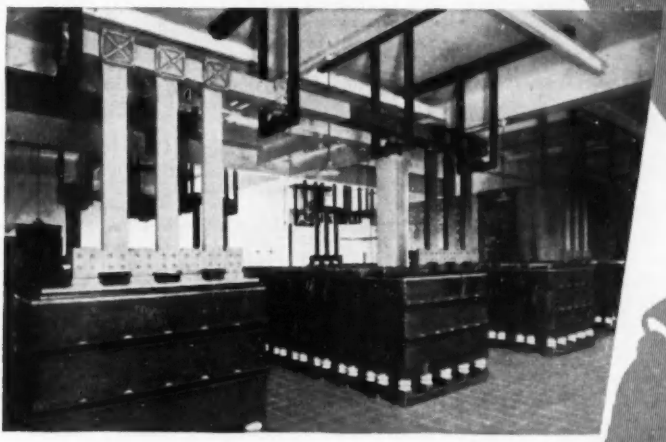

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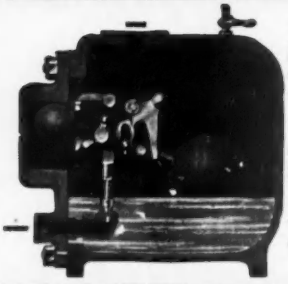

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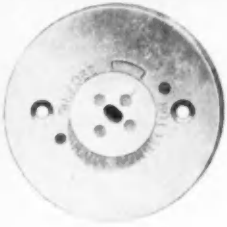

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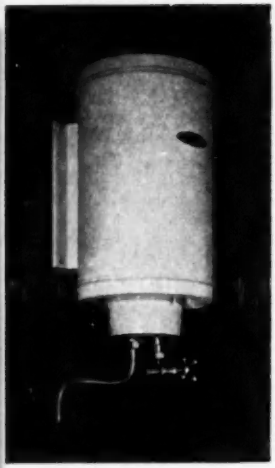

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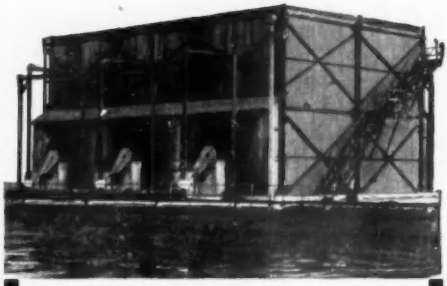

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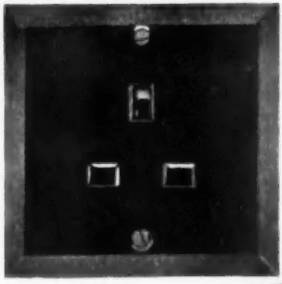

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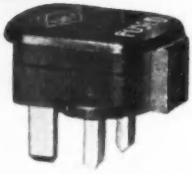

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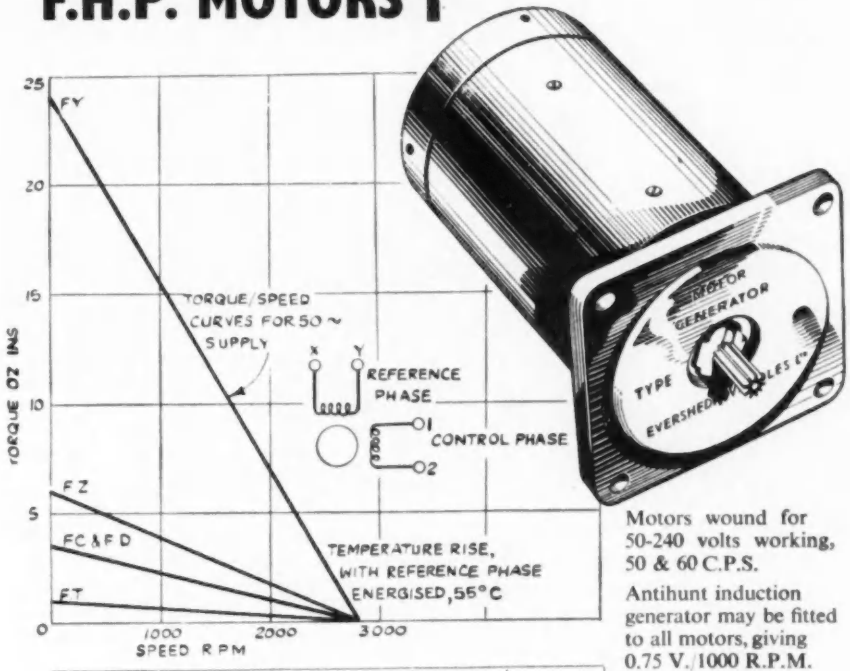

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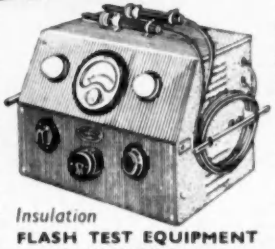

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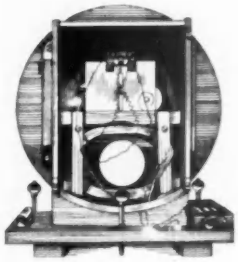

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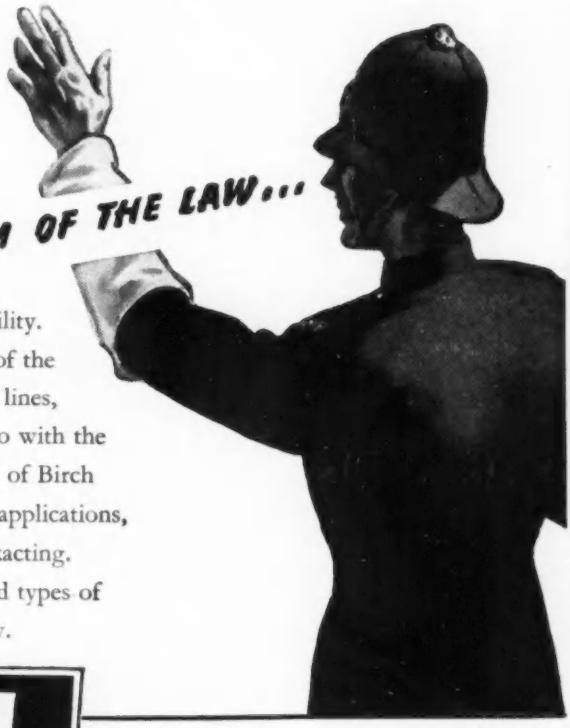

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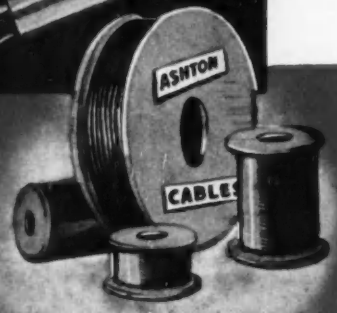

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